BULLETIN

DE LA

SOCIÉTÉ FOUAD 1er D'ENTOMOLOGIE

FONDEE LE 1er AOUT 1907

anciennement:
Société Entomologique d'Egypte (1907-1922)
et ***Société Royale Entomologique d'Egypte*** (1923-1937)

Placée sous le Haut Patronage du Gouvernement Egyptien
par Décret Royal en date du 15 Mai 1923

Année 1938

LE CAIRE
IMPRIMERIE P. BARBEY
1939

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TRENTE-ET-UNIÈME ANNÉE

VINGT-DEUXIÈME VOLUME

1938

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NOTA — La présente publication fait suite au BULLETIN DE LA SOCIETE ENTOMOLOGIQUE D'EGYPTE, années 1908-1922, et au BULLETIN DE LA SOCIETE ROYALE ENTOMOLOGIQUE D'EGYPTE, années 1923-1937 inclusivement.

Les opinions émises dans les publications de la Société sont propres à leurs auteurs. La Société n'en assume aucunement la responsabilité.

Date de parution et de distribution du présent Volume :
31 Janvier 1939

Le Rédacteur en Chef :
A. ALFIERI.

DÉCRET DONNANT LE NOM DE
FOUAD PREMIER
A DES INSTITUTIONS PUBLIQUES CRÉÉES SOUS SES AUSPICES [1]

Nous, FAROUK Ier, Roi d'Egypte,

Sur la proposition du Président de Notre Conseil des Ministres tendant à perpétuer le souvenir de feu le Roi Fouad Premier et à glorifier son nom, vu que son règne s'est distingué par des œuvres éminentes dans le domaine des réformes et par la création de maintes institutions publiques dont la réalisation s'est accomplie grâce à ses conseils et à sa sollicitude, ce qui a eu la plus grande influence sur l'orientation et le développement de la renaissance scientifique, littéraire, sociale et économique de l'Egypte;

Sur l'avis conforme de Notre Conseil des Ministres;

DECRETONS

Art. 1. — Le nom de Fouad Premier est donné aux institutions et établissements indiqués au tableau annexé au présent décret.

Art. 2. — Le Président de Notre Conseil des Ministres est chargé de l'exécution du présent décret, qui entrera en vigueur dès sa publication au « Journal Officiel ».

Fait au Palais de Montazah, le 11 Gamad Tani 1357 (7 Août 1938).

FAROUK

Par le Roi :

Le Président du Conseil des Ministres p.i.
ABDEL FATTAH YÉHIA

(*Traduction*)

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(1) Ce Décret a été publié dans le *Journal Officiel* du Gouvernement Egyptien, No. 94, du Jeudi 11 Août 1938.

TABLEAU

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2. Académie Fouad Premier de la Langue Arabe au lieu de Académie Royale de la Langue Arabe.
3. Institut Fouad Premier d'Hydrobiologie et de Pêche au lieu de Institut Royal d'Hydrobiologie et d'Acclimatation.
4. Institut Fouad Premier du Désert au lieu de Institut du Désert.
5. Institut Fouad Premier de Musique Arabe au lieu de Institut Royal de Musique Arabe.
6. Barrage Fouad Premier au lieu de Barrage de Nag-Hamadi.
7. Société Fouad Premier d'Entomologie au lieu de Société Royale Entomologique d'Egypte.
8. Société Fouad Premier d'Economie Politique, de Statistique et de Législation au lieu de Société Royale d'Economie Politique, de Statistique et de Législation.
9. Société Fouad Premier de Papyrologie au lieu de Société Royale Egyptienne de Papyrologie.
10. Société Nationale Fouad Premier du Croissant Rouge Egyptien au lieu de Société Nationale du Croissant Rouge Egyptien.
11. Société Fouad Premier pour la protection des Orphelins et Enfants trouvés au lieu de Société Royale de protection des Orphelins et Enfants trouvés.
12. Fédération Fouad Premier des Associations d'Assistance Publique (A.I.P.A.) au lieu de Fédération Royale des A.I.P.A.
13. Mosquée Fouad Premier au lieu de Mosquée d'Héliopolis.
14. Musée Fouad Premier des Chemins de Fer au lieu de Musée des Chemins de Fer.
15. Musée Fouad Premier des Postes au lieu de Musée des Postes.
16. Route Fouad Premier du Désert au lieu de Route du Désert.
17. Etablissement Fouad Premier d'Assiout au lieu de Etablissement d'Assiout.

Membres du Conseil de la Société FOUAD Ier d'Entomologie en 1938 :

SIÈGE VACANT, *Président.*

M. le Prof. Dr. HERMAN PRIESNER, *Vice-Président.*

M. le Prof. HASSAN C. EFFLATOUN Bey, *Vice-Président.*

M. ANASTASE ALFIERI, *Secrétaire-Général.*

M. RICHARD WILKINSON, *Trésorier.*

S.E. FOUAD ABAZA Pacha.

M. SAID BAHGAT Bey.

M. EDGARD CHAKOUR.

M. le Dr. KAMEL MANSOUR.

M. ABDEL MEGID EL MISTIKAWY.

M. le Dr. HAMED SELEEM SOLIMAN.

M. le Dr. SAADALLAH MOHAMED MADWAR.

Comité Scientifique :

M. le Prof. Dr. H. PRIESNER, M. le Prof. HASSAN C. EFFLATOUN Bey, M. le Dr. KAMEL MANSOUR, M. ANASTASE ALFIERI.

Censeurs :

M. le Dr. A. AZADIAN et M. E. KAOURK.

MEMBRES BIENFAITEURS :

1924 M. Moustapha El Salanikli Bey, de Damanhour (Béhéra).

1925 S.E. El Sayed Fathalla Mahmoud Pacha, de Rahmania (Béhéra).

» M. Riad Abdel Kawi El Gebali Bey, de Chebin El Kom (Menoufia).

» S.E. Georges Wissa Pacha, d'Assiout (Haute-Egypte).

» M. Yehia Kawalli Bey, de Minieh (Haute-Egypte).

» M. Yacoub Bibawi Attia Bey, de Minieh (Haute-Egypte).

» S.E. Hassan Charawi Pacha, de Minieh (Haute-Egypte).

» S.E. Habib Chenouda Pacha, d'Assiout (Haute-Egypte).

» M. Mohamed Tewfick Mohanna Bey, de Tewfikieh (Béhéra).

» M. Hassan Ahmed Moussa Bey, de Minieh (Haute-Egypte).

» M. Labib Barsoum Hanna Bey, de Minieh (Haute-Egypte).

» S.E. Hassan Mohamed El Tahtawi Pacha, de Guirgheh (Haute-Egypte).

» M. Kassem Osman El Labban Bey, de Guirgheh (Haute-Egypte).

» M. Dordeir El Sayed Ahmed El Ansari Bey, de Guirgheh (Haute-Egypte).

» M. Barsoum Said Abdel Messih Bey, de Minieh (Haute-Egypte).

» M. Dordeir Taha Abou Gounema Bey, de Minieh (Haute-Egypte).

1926 M. Mohamed Rifaat El Roznamgy Bey.

1927 M. le Dr. Walter Innes Bey, †.

» M. le Dr. Avocat Giovanni Ferrante, du Caire.

1928 M. Hassan C. Efflatoun Bey, du Caire.

» M. Hugo Lindeman, †.

1932 M. Alfred Reinhart, †.

BULLETIN

DE LA

SOCIÉTÉ FOUAD Ier D'ENTOMOLOGIE

Liste des Membres de la Société en 1938

(Les noms des Membres Fondateurs sont précédés de la lettre F)

Vice-Président Honoraire

F Ferrante (Dr. Avocat Giovanni), 14, Rue El Nemr, au Caire.

Membres Honoraires

1908 Alluaud (Charles), Les Ouches, à Crozant (Creuse), France.

» Bugnion (Dr. Edouard), « La Luciole », Avenue Pasteur, Aix en Provence (Bouches du Rhône), France.

1924 Ebner (Prof. Richard), 3, Beethovengasse, Vienne IX, Allemagne.

1909 Marchal (Dr. Paul), 45, Rue de Verrières, à Antony (Seine), France.

1917 Navas (R. P. Longin), Colegio del Salvador, Apartado 32, Zaragoza, Espagne.

1929 Parent (l'Abbé O.), Institution Ste Marie, Aire sur la Lys, Pas de Calais, France.

» Peyerimhoff de Fontenelle (P. de), 87. Boulevard Saint-Saëns, Alger, Algérie.

1908 Pic (Maurice), à Digoin (Saône et Loire), France.

1921 Pierre (Claude), 7 bis, Rue du Loing, Paris (XIVe), France.

1936 Seif El-Nasr Pacha (S.E. Ahmed Hamdi), Rue Khosro Pacha, Helouan, près le Caire.

1929 THÉRY (André), Laboratoire d'Entomologie, Museum National d'Histoire Naturelle, 45 bis, Rue de Buffon, Paris (Ve), France.

1920 TONNOIR (André), Senior Research Officer, Division of Economic Entomology, Council for Scientific and Industrial Research, P.O. Box 109, Canberra, F.C.T., Australia.

» VILLENEUVE (Dr. Joseph), Rue Président Paul Doumer, Rambouillet (Seine et Oise), France.

F WILLCOCKS (F.C.), « Brambles », Hurst Lane, Sedlescombe (near Battle), Sussex, Angleterre.

Membres Correspondants

1932 ALFKEN (J.D.), 18, Delmestrasse, Brême, Allemagne.

» BALLARD (Edward), District Commissioner's Office, Jerusalem, Palestine.

1924 CROS (Dr. Auguste), 6, Rue Dublineau, Mascara, Algérie.

1928 D'ORCHYMONT (A.), 176, Avenue Houba de Strooper, Bruxelles (II), Belgique.

1924 FALCOZ (Dr. Louis), 71, Rue de la Gare, Lyon-Villeurbanne, France.

» FLOWER (Major Stanley Smyth), Tring, Herts, Angleterre.

1934 GADEAU DE KERVILLE (Henri), 7, Rue du Passage Dupont, Rouen, France.

1926 HALL (W.J.), Superintendent of the Mazoe Estate and Experimental Station, B.S.A. Company Citrus Estate, Mazoe, Southern Rhodesia, South Africa.

1923 HERVÉ-BAZIN (Prof. Dr. J.), Le Patys, par Segré (Maine et Loire), France.

1924 HINDLE (Dr. Prof. Edouard), Magdelene College, Cambridge, Angleterre.

1931 HORN (Dr. Walther), Deutsches Entomologisches Institut, Gossler Str. 20, Berlin-Dahlem, Allemagne.

1923 HUSTACHE (A.), Pensionnat St. Laurent, à Lagny (Seine et Marne), France.

1925 Kirkpatrick (Thomas Winfrid), East African Agricultural Research Station, Section of Entomology, Amani (via Tanga), Tanganyika Territory, British East Africa.

1934 Koch (C.), c/o Monsieur Georges Frey, 18, Pinzenauerstrasse, Munich 27, Allemagne.

1929 Masi (L.), Museo Civico di Storia Naturale « Giacomo Doria », 9, Via Brigata Liguria, Genova (102), Italie.

1930 Mellor (J.E.M.), The Prospect Cottage, Bredwardine, Herefordshire, Angleterre.

1934 Paoli (Prof. Guido), Directeur du R. Osservatorio per le Malatie delle Piante, 1, Via Marcello Durazzo, Gênes, Italie.

» Schatzmayr (A.), Museo Civico di Storia Naturale, Corso Venezia, Milano, Italie.

1927 Williams (C.B.), Rothamsted Experimental Station, Harpenden, Angleterre.

Membres Titulaires

1913 Abaza Pacha (S.E. Fouad), Boîte Postale N° 63, au Caire.

1933 Abdel Malek (Ragheb), Entomologiste, Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1909 Alfieri (Anastase), Boîte Postale N° 430, au Caire.

1938 Attia (Rizk), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1924 Azadian (Dr. A.), Laboratoires d'Hygiène Publique, au Caire.

1908 Bahari Bey (G.C.), 11, Rue Seif el Dine El Mahrani, Fagala, au Caire.

1928 Bahgat Bey (Said), Boîte Postale N° 63, au Caire.

1938 Bailey Bros and Swinfen Ltd., Cathedral House, 8/11 Paternoster Row, Londres, E.C. 4, Angleterre.

1929 Bichara (Ibrahim), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1937 Biggs (H.E.), 12, Tera El Boulaquieh, au Caire.

1934 Bittar (Andrew), c/o Misr Air-Works, Almaza, près le Caire.

1938 Blancheteau (Marcel), Aux Amateurs de Livres, 56, Faubourg Saint-Honoré, Paris (VIIIe).

1923 Bodenheimer (Prof. F.S.), Directeur du Département de Zoologie Générale et d'Entomologie, Université Hébraïque, Boîte Postale No. 340, Jérusalem, Palestine.

1933 Calzolari (Emilio), Ingénieur Agronome, 28, Rue Chérif Pacha, Alexandrie.

1938 Carneri (Alexandre), Librairie Elpénor, 10, Rue Chakour Pacha, Alexandrie.

1929 Cassab (Antoine), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

F Chakour (Edgard), Secrétaire Général de la Société Anonyme des Eaux du Caire, Rue Foum El-Teraa El-Boulakia, au Caire.

1933 Chazette (Fernand), Professeur de Sciences Naturelles, Lycée Français, 2-4, Rue Haouayati, au Caire.

1931 Compagnie Universelle du Canal Maritime de Suez, Kasr el Doubara, au Caire.

1934 Crédit Foncier Egyptien (Monsieur l'Administrateur Délégué), Rue Manakh, au Caire.

1938 Dessouki (Mohamed Soliman), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

» Directorate of Agriculture, Ministry of Economics and Communications, Baghdad, Irak.

1928 Dollfus (Robert Ph.), Museum National d'Histoire Naturelle, 57, Rue Cuvier, Paris (Vme), France.

1919 Efflatoun Bey (Hassan C.), Professeur d'Entomologie et Vice-Doyen de la Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

1920 Efflatoun Pacha (S.E. Mohamed), Meadi, près le Caire.

1934 Université Fouad 1er, Faculté d'Agriculture, Ghizeh, près le Caire.

1933 Frangopoulos (A.M.), B.A., B.Sc., Assistant Government Entomologist, Nicosia, Cyprus.

1936 Fund Bib-ka Sredne-Asiatsk. Gos. Universiteta, Potchtovij jaschtik, No. 47, Taschkent, U.S.S.R.

1914 Garboua (Maurice), 1, Rue Soliman Pacha, au Caire.

1907 Garozzo (A.S.), Ingénieur, 5, Rue Champollion, au Caire.

1938 Ghabn (Dr. Abdel Aziz), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1927 Ghali Pacha (S.E. Wacef Boutros), Avenue de Ghizeh, près le Caire.

1938 Ghesquière (J.), 87, Avenue du Castel, Bruxelles, Belgique.

1935 Glyki (Marc), Ingénieur-Chimiste, Bureau Technique Agricole et Industriel, 2, Rue du Télégraphe Anglais, Alexandrie.

1921 Greiss (Elhamy), Département Botanique, Faculté des Sciences, Université Fouad 1er, Abbassieh au Caire.

1936 Hafez Ibrahim (Mahmoud), Démonstrateur au Département de Zoologie, Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

1938 Hamza (Soliman), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1930 Hanafy Bey (Mahmoud), 12, Rue Akhshid, Manial El Roda, près le Caire.

1938 Hanna (Dr. Assaad Daoud), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1928 Hassan (Dr. Ahmed Salem), Professeur de Zoologie et d'Entomologie à la Faculté d'Agriculture, Université Fouad 1er, Ghizeh, près le Caire.

1932 His Majesty Stationery Office, Princes Street, Westminster, S.W.1, London, Angleterre.

1925 Hocheiry (Abd-El-Baki Zaki El), Conseiller à la Cour d'Appel Indigène, 22, Rue Abou el Feda, Zamalek, au Caire.

1924 Honoré (A.), Chimiste, Raffinerie de Hawamdieh, Haute-Egypte.

1927 Housny (Mahmoud), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 Ibrahim (Abdel Hamid), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1936 Imperial Chemical Industries (Egypt) S.A., 19, Rue Kasr el Nil, au Caire.

1930 Independent Biological Laboratories, 23, Nve Shaanan, P.O. Box 1071, Tel Aviv, Palestine.

1938 Itribi (Abbas El), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1928 Izzet Bey (Mohamed), 14, Midan el Daher, au Caire.

1915 Jullien (Joseph), 248, Rue de Thèbes, Cleopâtra les Bains, par Sidi-Gaber, Ramleh.

1927 Kamal (Dr. Mohamed), Cotton Research Board, Ministère de l'Agriculture, Ghizeh, près le Caire.

1922 Kaourk (Elias A.), Avocat, 35, Rue Kasr el Nil, au Caire.

1926 Kassem (Mohamed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 Klein (Henry Z.), Agricultural Research Station, Rehoboth, Palestine.

1937 Koeber (H.), Ingénieur, Directeur des Carrières Gouvernementales, Abou Zaabal, Basse-Egypte.

1923 Laboratoires d'Hygiène Publique, Bibliothèque de la Section d'Helminthologie, au Caire.

1931 Land Bank of Egypt (Mons. l'Administrateur-Directeur de la), Boîte Postale No. 614, Alexandrie.

1923 Librarian, Agricultural Research Service, Wad Medani, Soudan.

1934 Lotte (Dr. F.), Boîte Postale No. 222, Port-Said.

1937 Loutfy (Abdel Aziz), Professeur d'Entomologie, Ecole d'Agriculture, Chebin El Kom, Basse-Egypte.

1931 Lycées Français, 2-4, Rue Haouayati, au Caire.

1932 Madwar (Dr. Saadallah Mohamed), Research Institute and Endemic Diseases Hospital, 10, Rue Kasr El Aini, au Caire.

» Malœuf (Dr. N. S. Royston), Osborn Zoological Laboratory, Yale University, New Haven, Connecticut, Etats-Unis d'Amérique.

1927 MANSOUR (Dr. Kamel), Professeur-adjoint, Département de Zoologie, Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

1938 MINISTÈRE DE L'INSTRUCTION PUBLIQUE, Section des Dépôts, au Caire.

1921 MISTIKAWY (Abdel Megid El), Sous-Directeur de la Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1933 MOCHI (Dr. Alberto), 119, Avenue Malika Nazli, au Caire.

1929 MOSSERI (Henri), 25, Rue Cheikh Abou El Sebaa, au Caire.

1938 NOMAN (Mohamed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1911 PETROFF (Alexandre), 15, Boulevard Saad Zagloul, Alexandrie.

1928 PRIESNER (Prof. Dr. H.), Directeur de la Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1932 RIVNAY (E.), Institute of Agriculture and Natural History, Agricultural Experiment Station, P. O. Box 121, Tel Aviv, Palestine.

1925 ROYAL ENTOMOLOGICAL SOCIETY OF LONDON (The), 41, Queen's Gate, South Kensington, S.W. 7, Londres, Angleterre.

1938 RUNKEWITZ (G.), Savoy Hotel, Louxor, Haute Egypte.

» SHAFEI (Mohamed Aly Ismail El), 18, Midan Mohamed Aly, au Caire.

» SHAFIK (Dr. Mohamed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1924 SHAW (Fred), Maadi, près le Caire.

1938 SOCIÉTÉ DU NAPHTE S.A. (A.I. Mantacheff & Co.), 1, Rue de l'Eglise Debbané, Alexandrie.

1921 SOCIÉTÉ ROYALE D'AGRICULTURE, Laboratoire d'Entomologie de la Section Technique, Boîte Postale No. 63, au Caire.

1934 SOLIMAN (Dr. Hamed Seleem), Faculté d'Agriculture, Université Fouad 1er, Ghizeh, près le Caire.

1928 Soliman (Dr. Labib Boutros), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1936 Taher El Sayed (Dr. Mohamed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1933 Taihoku Imperial University Library (The), Taihoku, Formosa, Japon.

1926 Tewfik (Mohamed), Assistant Entomologiste, Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

1933 Torriani (Guido), Professeur de Sciences Naturelles aux Ecoles Royales Moyennes Italiennes, Appartement No. 38, 42, Rue Soliman Pacha, au Caire.

1935 Tractor Company of Egypt, S.A.E. (The), 140, Rue Emad El Dine, Boîte Postale No. 366, au Caire.

1923 Vallet (Jean), Avocat, Immeuble Rabbat, Avenue Fouad Ier, au Caire.

1926 Waly (Dr. Mohamed), Conférencier en Zoologie, Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

1912 Wilkinson (Richard), Pyramid House, 24, Rue Saraya El Gezira, Zamalek, au Caire.

1938 Zoheiry (Mohamed Soliman El), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1915 Zoological Service, Ghizeh, près le Caire.

1926 Zulficar (Samir), Maadi, près le Caire.

Institutions Scientifiques et Bibliothèques

Afrique Occidentale Française:

Monsieur le Gouverneur Général (Comité d'Etudes Historiques et Scientifiques), Dakar, Sénégal.

Afrique du Sud:

South African Museum, P.O. Box 61, Cape Town.

Department of Agriculture of the Union of South Africa (The Agricultural Journal of the Union of South Africa), Pretoria.

Department of Agriculture of the Union of South Africa, Division of Entomology, P.O. Box 513, Pretoria.

The Director, The Transvaal Museum, P.O. Box 413, Pretoria, South Africa.

Algérie:

Société d'Histoire Naturelle de l'Afrique du Nord, Faculté des Sciences d'Alger, Alger.

Allemagne:

Deutsche Entomologische Gesellschaft, 43, Invalidenstrasse, Berlin (IV).

Senckenbergischen Naturforschenden Gesellschaft, Bibliothek, Viktoria Allee 9, Frankfurt A/M.

Bücherei des Zoologischen Museums, 43, Invalidenstrasse, Berlin (IV).

Gesellschaft für Vorratsschutz E.V. (Mitteilungen der), 31, Zimmermannstrasse, Berlin-Steglitz.

Bücherei der Biologischen Reichsanstalt für Land- und Forstwirtschaft, 19, Königin-Luise-Str., Berlin-Dahlem.

Deutches Entomologisches Institut (Arbeiten über morphologische und taxonomische Entomologie), 20, Gossler Strasse, Berlin-Dahlem.

Deutsche Kolonial und Uebersee-Museum, Bahnhofsplatz, Brême.

Administration-Kanzlei des Naturhistorischen Museums, Burgring 7, Vienne (I).

Zoologisch-Botanische Gesellschaft, 2, Mechelgasse, Vienne (III).

Koleopterologische Rundschau, c/o Zoologisch-Botanische Gesellschaft, 2, Mechelgasse, Vienne (III).

Angleterre:

The Imperial Institute of Entomology, Review of Applied Entomology, 41, Queen's Gate, London S.W. 7.

Zoological Museum (Novitates Zoologicæ), Tring Park, Tring, Herts.

The Apis Club (The Bee World), The Way's End, Foxton, Royston, Herts.

The Philosophical Society of Cambridge, Zoological Laboratory, The Museums, Cambridge.

The Librarian, The Zoological Society of London, Zoological Gardens, Regent's Park, London, N.W.8.

The Librarian, Department of Entomology, University Museum, Oxford.

Argentine:

Instituto Biologico de la Sociedad Rural Argentina, Buenos Aires.

Sociedad Cientifica Argentina, Calle Santa Fé, 1145, Buenos Aires.

Sociedad Entomologica Argentina, Museo Nacional de Historia Natural, Buenos Aires.

Museo Nacional de Historia Natural « Bernadino Rivadavia », Casilla de Correo N° 470, Buenos Aires.

Ministerio de Agricultura (Boletin del Ministerio de Agricultura de la Nacion), Bibliotheca, 974, Paseo Colon, Buenos Aires.

Australie:

The Australian Museum (Records of the Australian Museum), Sydney, N.S.W.

The Entomologist's Office, Department of Agriculture, Sydney, N.S.W.

The Public Library, Museum, and Art Gallery of South Australia, Box 386 A, G.P.O., Adelaide, South Australia.

The Library of the Division of Economic Entomology, P.O. Box No. 109, Canberra City, F.C.T.

The Linnean Society of New South Wales, Science House, Gloucester and Essex Streets, Sydney, N.S.W.

Belgique:

Société Entomologique de Belgique, 31, Rue Vautier, Bruxelles.

Société Scientifique de Bruxelles, Secrétariat, 11, Rue des Récollets, Louvain.

Monsieur A. Moureau, Secrétaire du Bulletin de l'Institut Agronomique et des Stations de Recherches de Gembloux, Institut Agronomique de l'Etat, Gembloux.

Lambillionea, Revue Mensuelle de l'Union des Entomologistes Belges (M. F. Derenne), 123, Avenue de la Couronne, Ixelles (Bruxelles).

Annales du Musée du Congo Belge, Tervueren.

Association des Ingénieurs sortis de l'Institut Agronomique de l'Etat, à Gembloux, 35, Avenue des Volontaires, Anderghem-Bruxelles.

Brésil:

Museu National do Rio de Janeiro, Rio de Janeiro.

Instituto Biologico, Bibliotheca, Caixa Postal 2821, Sâo Paulo.

Instituto Oswaldo Cruz, Caixa de Correio 926, Rio de Janeiro.

Instituto de Biologia Vegetal, Jardim Botanico, Rio de Janeiro.

Bulgarie:

Institutions Royales d'Histoire Naturelle, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Société Entomologique de Bulgarie, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Société Bulgare des Sciences Naturelles, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Canada:

Entomological Society of Ontario (The Canadian Entomologist & Reports), Guelph, Ontario.

Library, Department of Agriculture, West Block, Ottawa.

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Chine:

The Lingnan Science Journal, Lingnan University, Canton.

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Chypre:

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Cuba:

Sociedad Cubana de Historia Natural « Felipe Poey » (Memorias), c/o Dr. Carlos Guillermo Agnayo, 25 N° 254, Vedado, La Havane.

Danemark:

Entomologisk Forening, Zoologisk Museum, Krystalgade, Copenhague.

Egypte:

Bibliothèque du Cabinet de S.M. le Roi, Palais d'Abdine, au Caire.

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Société Royale d'Agriculture, Bibliothèque de la Section Technique, Boîte Postale N° 63, au Caire.

Union des Agriculteurs d'Egypte, 25, Rue Cheikh Abou El Sebaa, au Caire.

The Bee Kingdom, 60, Rue Menasce, Alexandrie.

Bibliothèque Centrale, Cotton Research Board, Ministère de l'Agriculture, Ghizeh, près le Caire.

Al-Fellaha, Boîte Postale N° 2047, au Caire.

Société Royale de Géographie d'Egypte, 45, Rue Cheikh Youssef, au Caire.

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Société Fouad 1er d'Economie Politique, de Statistique et de Législation, Boîte Postale N° 732, au Caire.

Institut d'Egypte, 1, Rue Cheikh Rihan, au Caire.

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Bibliothèque du Musée Agricole Fouad Ier, c/o Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

Bibliothèque de la Faculté de Médecine, Université Fouad 1er, au Caire.

Bibliothèque de la Faculté des Sciences, Université Fouad 1er, Abbassieh, au Caire.

Equateur (République de l'), Amérique du Sud:

Director General de Agricultura (Revista del Departamento de Agricultura), Quito.

Boletin de la Seccion Agricola del Banco Hipotecario del Ecuador, Apartado 685, Quito.

Espagne:

Instituto Nacional de 2ª Ensenanza de Valencia, Laboratorio de Hidrobiologia Espanola, Valencia.

Junta para ampliacion de Estudios e Investigaciones Cientificas, 4, Duque de Medinaceli, Madrid.

Junta de Ciencies Naturales de Barcelona, Museo Municipal, Barcelona.

Academia de Ciencias y Artes de Barcelona, Barcelona.

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Estacion de Patologia Vegetal, Instituto Nacional Agronomico, La Monclea, Madrid (VIII).

Etats-Unis:

Buffalo Society of Natural Sciences, Buffalo Museum of Science, Humboldt Park, Buffalo, New-York.

University of Illinois Library, Exchange Division, Urbana, Illinois.

Library of the American Museum of Natural History, Central Park, West at 79th Street, New-York City.

Pacific Coast Entomological Society (The Pan-Pacific Entomologist), California Academy of Sciences, Golden Gate Park, San Francisco, California.

Academy of Natural Sciences, Entomological Section, Lagon Square, Philadelphia.

Experiment Station of the Hawaiian Sugar Planters' Association, P.O. Box 411, Honolulu, T.H., Hawai.

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Carnegie Museum, Department of the Carnegie Institute, Pittsburgh, Pennsylvania.

American Entomological Society, Academy of Natural Sciences, Lagon Square, Philadelphia, Pa.

United States Department of Agriculture, Washington, D.C.

General Library, University of Michigan, Ann Arbor, Michigan.

United States National Museum, Smithsonian Institution, Washington, D.C.

University of California Library, Berkeley, California.

Library of the New-York State College of Agriculture and Agricultural Experiment Station, Cornell University, Ithaca, New-York.

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New-York Academy of Sciences, New-York.

Pennsylvania State Health Department, Pennsylvania.

Entomological Society of Washington, Washington.

Graduate School of Tropical Agriculture and Citrus Exprimental Station, Riverside, California.

Wisconsin Academy of Sciences, Arts, and Letters, Madison, Wisconsin.

Library, Minnesota Agricultural Experiment Station, University Farm, Saint Paul, Minnesota.

Museum of Comparative Zoology, Harward College, Cambridge, Mass.

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Editorial Office, The American Midland Naturalist, University of Notre Dame, Notre Dame, Indiana.

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Finlande:

Societas Entomologica Helsingforsiensis, Helsinki.

Societas pro Fauna et Flora Fennica, Kaserngatan 24, Helsinki.

Societas Zoolog.-Botanica Fennica Vanamo, Fabiani 22, Helsinki, Suomi.

Société Entomologique de Finlande (Annales Entomologici Fennici), Institut de Zoologie Agricole et Forestière de l'Université, Snellmaninkatu 5, Helsinki.

France:

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Société d'Etudes des Sciences Naturelles de Nîmes, 6, Quai de la Fontaine, Nîmes (Gard).

Société de Pathologie Végétale et d'Entomologie Agricole de France, Laboratoire de Pathologie Végétale, Institut National Agronomique, 16, Rue Claude Bernard, Paris (V^e^).

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Société Linnéenne de Lyon, 33, rue Bossuet (Imm. Municipal), Lyon.

Société des Sciences Naturelles de l'Ouest de la France, Nantes (Loire Inférieure).

Association des Naturalistes de Levallois-Perret, 153, rue du Président Wilson (Domaine de la Planchette), Levallois-Perret (Seine).

Société Linnéenne du Nord de la France, 81, rue Lemerchier (M. Pauchet), Amiens.

Société Géologique de Normandie et des Amis du Museum du Havre, Hôtel des Sociétés Savantes, 56, rue Anatole France, Le Havre (Seine Inférieure).

Société d'Histoire Naturelle de Toulouse, Bibliothèque Universitaire de la Faculté de Médecine, Allée Saint-Michel, Toulouse.

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Museum National d'Histoire Naturelle, Bibliothèque, 8, Rue de Buffon, Paris (Ve).

Société de Zoologie Agricole (Revue de Zoologie Agricole et Appliquée), Faculté des Sciences, Institut de Zoologie, Cours de la Marne, Bordeaux.

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Institut Phytopathologique Benaki, Kiphissia (près Athènes).

Bibliothèque de l'Institut et Musée Zoologique de l'Université, Athènes.

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Hongrie:

Magyar Nemzeti Muzeum (Allattar), Museum Nationale Hungaricum, Sectio Zoologica, Budapest 80.

Indes:

Zoological Survey of India (Records of the Indian Museum), Indian Museum, Calcutta.

Madras Governement Museum, Connemara Public Library, Egmore, Madras.

Agricultural Research Institute, Library, Pusa, Bihar.

Agricultural Research Institute, Entomological Section, Pusa Bihar.

Indes Néerlandaises:

Instituts Scientifiques de Buitenzorg's Lands Plantentuin (Treubia), (den Directeur van Landbouw, Nijverheid en Handel), Buitenzorg, Java.

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Museo Civico di Storia Naturale « Giacomo Doria », 9, Via Brigata Liguria, Genova (102).

Rivista di Biologia Coloniale, 326, Viale Regina Margherita (Policlinico), Roma.

Museo Civico di Storia Naturale di Trieste (Atti del), 4, Piazza Hortis, Trieste (10).

Società dei Naturalisti in Napoli, Reale Università, Via Mezzocannone, Napoli.

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Società Adriatica di Scienze Naturali, 7, Via dell'Annunziata, Trieste.

La Reale Stazione di Entomologia Agraria (Redia), 19, Via Romana, Firenze (32).

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Bibliothèque de l'Institut International d'Agriculture (Moniteur International de la Protection des Plantes), Villa Umberto I, Rome (110).

Società italiana di Scienze Naturali, Palazzo del Museo Civico di Storia Naturale, Corso Venezia, Milano.

Istituto di Zoologia della Reale Università di Genova (Bollettino dei Musei di Zoologia e di Anatomia comparata), 5, Via Balbi, Genova.

Società dei Naturalisti e Matematici di Modena, presso la Reale Università, Modena.

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Istituto Agricolo Coloniale Italiano, 9, Viale Principe Umberto, Firenze (8).

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Japon:

Saghalien Central Experiment Station, Konuma, Saghalien.

The Ohara Institute for Agricultural Research, Library, Kurashiki, Okayama-Ken.

Imperial Agricultural Experiment Station (Journal of the), Nishigahara, Tokyo.

Departement of Agriculture, Government Research Institute, Taihoku, Formosa.

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Mexique:

Junta Nacional Directora de la Campana contra la Langosta (Junosta), Biblioteca, Departamento Directivo, Veracruz.

Bibliotheca del Instituto Biotecnico, Calzada Mexico-Tacuba N° 295, Col. Anahuac, D.F.

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Norvège:

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Panama (République de):

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Société Portugaise des Sciences Naturelles, Instituto de Fisiologia, Faculdade de Medicina, Lisbonne.

Museum Zoologique de l'Université de Coimbra, Largo Marquês de Plombal, Coimbra.

Associçao da Filosofia Natural, na Faculdade de Ciencias, Porto.

Roumanie:

Société Transylvanienne des Sciences Naturelles (Siebenbürgischer Verein für Naturwissenschaften), Hermannstadt, Sibiu.

Academia Romana, Bibliothèque, Calea Victoriei, 125, Bucarest.

Russie (U.S.S.R.):

Société Entomologique de Russie (Revue Russe d'Entomologie et Horae), Musée Zoologique de l'Académie des Sciences, Léningrad.

Bibliothèque de l'Académie des Sciences de l'Ukraine, 58a, Rue Korolenko, Kiew (Ukraine).

Société des Naturalistes de Kiew, 37-10, Rue Korolenko, Kiew (Ukraine).

Institut des Recherches Biologiques de l'Université de Perm, Perm II, Zaimka.

Institute for Plant Protection, Bureau of Applied Entomology and Zoology, Library, 10, Elagin Ostrov, Léningrad.

Rédaction du Journal « Plant Protection », 7, Rue Tschaikovsky, Leningrad.

Institute for controlling Pests and Diseases, Library, 7, Tschaikovsky Str., Leningrad 28.

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Bibliothèque de l'Université de Lund, Lund.

Suisse :

Bibliothèque de la Société Entomologique Suisse, Musée d'Histoire Naturelle, Berne.

Zentralbibliotek, Naturforschenden Gesellschaft, Zurich.

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Societas Entomologica (Casopis), u Karlova 3, Prague II.

Section Entomologique du Musée National de Prague (Sbornik), Vaclavské namesti II.-1700, Prague.

Bibliothèque de la Société Zoologique Tchécoslovaque, Institut de Zoologie, Karlov 3, Prague II.

Uruguay (République de l') :

Escuela de Veterinaria del Uruguay (Anales de la Escuela de Veterinaria del Uruguay), Itazaingo 1461, Montévideo.

Sociedad de Biologia de Montevideo, Casilla de Correo 567, Montevideo.

Yougo-Slavie :

Societas Entomologica Jugoslavica (Glasnik), 17, Garasaninovo ulica, Belgrade.

Abonnements de la Société

The Transactions and Proceedings of the Royal Entomological Society of London.

The Macrolepidoptera of the World, édité par le Dr. A. Seitz (suspendu à partir du mois de Juin 1937).

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N.B. — Pour changement d'adresse, erreurs ou omissions, s'adresser à Monsieur le Secrétaire Général de la Société Fouad 1er d'Entomologie, Boîte Postale N° 430, au Caire.

Séance du 19 Janvier 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

g. M. n

Insects injurious to vegetables and shrubs in the Jordan Valley, Huleh area and the Upper Galilee

by A. GRUNBERG, Agr. Eng.,
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It is intended in this paper to submit a list of insects of economic importance occurring in vegetable gardens and shrubs in the north and north-east of Palestine — covering the area of the Jordan Valley, Huleh and the Upper Galilee. It is hoped that this may be of interest and use in connection with further investigation work as well as for the vegetable grower. The observations were carried on during a period of nearly five years, viz. May-December 1931, and April 1933 to June 1937.

Beside the identifications and special names short observations on the biology of insects, extend of injury, hosts and so on are added.

No control measures will be discussed here.

New records of genera or species are marked by ⊙

1. ORTHOPTERA

In years when no invasion of the desert locust (*Schistocerca gregaria* Forskal) occurs (and there are such years!) the activity of the different grasshoppers is economically speaking restricted. The most important of them are :

Acridiidae

Acrida turrita L.
Upper Galilee, Jordan Valley and Huleh.

Acridella nasuta L.
Upper Galilee, Jordan Valley and Jericho.

⊙ **Dociostaurus anatolicus Kr.**

Huleh and Jordan Valley.

Aiolopus thalassinus F.

Jordan Valley.

⊙ **Aiolopus strepens Latr.**

Jordan Valley.

Anacridium aegyptium L.

Jordan Valley, Upper Galilee and Huleh.

Calliptamus paleastinensis Ramme.

Jordan Valley, Upper Galilee and Huleh.

⊙ **Thisoecetrinus pterostichus F.W.**

Upper Galilee.

Locusta migratoria migratorioides.

Once attempted to assume the phase *gregaria*.

The damage caused by the last 4 grasshoppers may some years be substantial. The number of different genera of this family met in the north of Palestine is of course much higher than cited here.

Tettigonidae

Saga ephippigera F.W.

A huge species obtained from the Jordan Valley and Huleh.

Decticus albifrons F.

Jordan Valley.

Tylopsis spp.

Jordan Valley and Huleh.

Blattidae

Of no economical importance in vegetable gardens.

Gryllidae

Gryllotalpa gryllotalpa L.

An important pest of northern Palestine; the range of its hosts is wide; it is found in irrigable vegeable gardens, tree nurseries, etc.

2. THYSANOPTERA

Retithrips aegyptiacus Marchal.

An important pest of ornamental plants such as myrtle, roses, vine, and

trees (*Acacia cyanophylla*, persimmon, *Ricinus*, etc.) in the Jordan Valley.

In case of *Vitis vinifera* the damage is of marked economic importance (Jordan Valley and Emek) as the premature severe shedding of leaves stops the formation of proper wood.

The thrips makes its appearance in the Jordan Valley late in summer, toward the end of July (red larvae) the attack becoming injurious only during August-September, its activity decreases during October and it finally disappears with the beginning of the cold season (end November).

3. HEMIPTERA

Homoptera

Jassidae

Empoasca libyca B. (=benedettoi P.).

Is one of the most important vegetable pests in the country. The leafhopper appears in the Jordan Valley towards the end of April and is usually observed there during the summer and as late as November-December. *Empoasca lybica* was observed also in the Huleh area and Upper Galilee. The hosts are different Solanaceae especially egg-plants (*Solanum melongena*), tomatoes, potatoes, etc., as well as Vine, *Ricinus* and other plants.

Aphidae

The Aphidae prove very injurious to a wide range of vegetables in the discussed area. Not all of them were identified and only the most important are submitted here.

Aphis gossypii Glover.

Is a destructive pest on Cucurbitaceae (cucumbers, melons, water-melons, marrows, etc.) ; hundred of dunums were observed to be destroyed (especially late in summer and spring). It appears in October and is observed till April inclusive in the Jordan Valley.

The area of distribution is Jordan Valley, Upper Galilee and Huleh.

Myzus persicae Sulz.

Is found on beets, tomatoes, *Nerium oleander* and other plants. It is a pest of somewhat lesser economic importance.

Brevicoryne brassicae L.

Is the Aphis of Cruciferae (observed on cabbage, cauliflower, kohlrabi, Brussel sprouts, Brucoli radish, etc.) and is a destructive pest in northern Palestine, appearing usually in November (Jordan Valley) and disappearing in April-May.

Aphis medicaginis Koch and Aphis leguminosae Theobald.

Were observed on horse bean (*Vicia faba*) and different other Papilionaceae.

Unidentified Aphidae were observed on roses, carrots, and *Mesembryanthenum* and other plants in the Jordan Valley and Upper Galilee.

Aleurodidae

White flies (not yet identified) are sometimes very injurious to young tomato and egg-plant seedlings in beds and soon after planting. They are chiefly active during July-August-September. They were observed in different places in the Jordan Valley.

As soon as the young plants grow stronger and the number of the leaves increases no damage of importance was noticed.

Aleurodes brassicae Wlk.

Was observed on young Cruciferae.

Heteroptera

Of very restricted economical importance. But the following insects should be mentioned.

Pentatomidae

Nezara viridula L.

Is common in the Jordan Valley and may cause some damage to tomatoes (fruit) and tobacco (June-August) and also to other plants, the bug being of polyphagous habits.

Stenozygum coloratum Klug.

On different host plants and usually of limited economical importance in the Jordan Valley.

Miridae

Cyrtopeltis tenuis Reut.

Was observed in the Jordan Valley to attack young egg-plants (September-October) ; the damage may vary from slight to moderate.

4. LEPIDOPTERA

Scythridae (Elachistidae)

Scythris spec.

Known as "ed duda". — Jordan Valley and the Galilee, important pest of Gramineae.

Plutellidae

Plutella maculipennis Curt.

This moth is injurious to different Cruciferae — chiefly to young plants in seed beds or after being planted out. The moth is especially active in the Jordan Valley during end of summer and beginning of winter (October-December) although there seems not to be any interruption of the development all the year round. Damage varies from slight to moderate.

Pyralidae

Hellula undalis F.

This "heart worm" is a very important pest of young Cruciferae in Palestine. It seems however that in the Jordan Valley the damage is less than in other parts of the country.

Lycaenidae

Virachola livia Klug.

Beside being the extremely destructive pest of pomegranates the larvae of this butterfly were also observed to attack peas in the Jordon Valley. The pods were infested during March (Tiberias).

Pieridae

Pieris brassicae L.

Is a pest of Cruciferae observed in the Jordan Valley, Upper Galilee and Huleh. The larvae of *Pieris brassicae* are blackish with yellow strips and are met in great numbers on isolated plants, the damage is usually limited to those isolated plants in the garden where the larvae feed i.e. to a limited percentage of the total number of seedlings. The destruction of these plants however may be complete.

Pieris rapae L.

The larvae are green, appear in small numbers, but are distributed in the entire garden. The damage is small.

Both *Pieris brassicae* and *Pieris rapae* are heavily parasited by *Microgaster* spec. during the winter months.

Nymphalidae

Pyrameis cardui L.

Larvae of *P. cardui* appear in the Jordan Valley in mild winters in middle of January and in rainy and cold winters middle February ; the pupation begins toward end of March. In certain years *P. cardui* may become a pest of importance — displaying polyphagous habits ; they attack — inter alia

— *Vicia faba* (leaves and pods), Cruciferae, onions, egg-plants, potatoes, beans, etc., but their proper breeding places are chiefly wild Malvaceae (*Malva parviflora*). The winter period is the only time when *P. cardui* may be expected to cause trouble.

Noctuidae

Numerous Noctuid larvae are active in vegetable gardens of the Jordan Valley, Huleh area and the Upper Galilee attacking lettuce, beets, tobacco, Papilionaceae and others. In general the damage of Noctuid larvae is of economic importance in the discussed area. The most commonly observed are :—

Plusia spp.

Prodenia litura F.

The destructive pest of berseem.

Caradrina exigua Hb.

On maize and others.

5. COLEOPTERA

Coccinellidae

Epilachna chrysomelina F.

The larvae and adults of the "12-spotted ladybird beetle" prove very injurious to all cultivated Cucurbitaceae in the Jordan Valley, Upper Galilee and Huleh. The extent of damage is great, larvae appear in the Jordan Valley during April and disappear almost towards the end of November.

Chrysomelidae

Rhaphidopalpa foveicollis Luc.

This beetle is destructive to Cucurbitaceae in the Jordan Valley, Upper Galilee and Huleh. The larvae attack the roots, and adults feed on aerial parts of the plants. Period of activity in the Jordan Valley is from beginning of April till the beginning of the winter season.

⊙ **Entomoscelis berytensis Reh.**

Is a minor pest of Cruciferae in the Jordan Valley, the larvae may become injurious to cultivable plants although they feed on wild Cruciferae. Females oviposite in the Jordan Valley during first half of the December and first larvae appear before the end of the month. A new generation emerges about the middle of March.

Phyllotreta cruciferae G.

This flea beetle is a pest of young Cruciferae (in beds after transplanting) in the Jordan Valley, Upper Galilee and Huleh; in case of young plants the damage may be severe; fullgrown plants suffer less.

Bruchidae

The Bruchidae family is well represented in the Jordan Valley and Upper Galilee. The following species were observed :

Bruchus pisorum L.

The important pest of peas.

⊙ **Bruchus ovalis Bl.**

Jordan Valley.

⊙ **Bruchus annulipes All.**

Jordan Valley.

⊙ **Bruchus seminarius L.**

Jordan Valley and Upper Galilee.

⊙ **Bruchus leucophaeus All.**

Jordan Valley and Upper Galilee.

⊙ **Bruchus albolineatus Bl.**

Upper Galilee.

Bruchus tristis Boh.

Upper Galilee.

⊙ **Bruchus poecillus Germ.**

Upper Galilee.

Spermophagus sericeus Geoffr.

Jordan Valley and Upper Galilee on Leguminoseae.

The damage of all these species is only occasionally of importance.

Elateridae

Wireworms were met in certain soils in the Jordan Valley (Migdal, Deganya, vicinity of Lubya and Beisan). Tobacco plants suffered more than any others.

The most common are :

⊙ **Melanotus fusciceps Gyl.**

⊙ **Melanotus torosus Er.**

⊙ **Aeoloides bicarinatus Rtt.**

Lower Jordan Valley.

Curculionidae

Lixus spp. should be considered as a serious pest of beets in the Jordan Valley and Upper Galilee. The eggs are laid on petioles of the leaves and after some time the larvae penetrate the roots; numerous larvae may be met in a single beet reducing to next to nothing the commercial value of the crop. The first half of March is to be considered as the period of intensive *Lixus* oviposition in the Jordan Valley (less intensive in the Upper Galilee and Huleh) — increasing toward the end of the month. A second generation hatching end May-June is destructive to later crop.

The common species of *Lixus* in the Jordan Valley are :

⊙ **Lixus iridis Olib.**

Lixus algirus F.

Lixus junci Boh.

Lower Jordan Valley.

⊙ **Hypera fausti Petri.**

Strawberries were severely attacked in the Jordan Valley by larvae of *Hypera fausti* (during March). The larvae are small green with a white longish narrow strip on the back. The larvae attack the foliage — the attacked leaves displaying a multitude of small holes.

Dynastidae

⊙ **Pentodon bispinifrons Reitter.**

This "cockchafer" proved very injurious in the Jordan Valley to different plants such as roses, vines, etc. In a single garden near Tiberias about 300 young roses shrubs were destroyed. Adults appear in May-June.

⊙ **Pentodon monodon F.**

Is active in the lower Jordan Valley (Jericho).

Melolontidae

⊙ **Polyphylla fullo L.**

Is another "cockchafer" met in he Upper Galilee but its activity seems to be of small economic importance in connection with vegetables or shrubs.

6. HYMENOPTERA

Tenthredinidae (Sawflies)

⊙ **Arge proxima André.**

This is a very destructive pest of Cruciferae and other plants in the Huleh area and Upper Galilee. Larvae appear toward the end of summer and were observed to pupate in November-December. Adults emerged on March.

No Sawfly was observed in the Jordan Valley itself.

7. DIPTERA

Anthomyidae

Pegomyia hyoscyami Pan.

Is a common pest of beets in the Jordan Valley ; the damage is generally restricted and only occasionally of greater importance (Beisan, February, 1936) ; the mining maggots were observed in the Jordan Valley during January-February. Adults hatched in March.

Agromyzidae

⊙ **Melanagromyza spec.**

Is a pest of peas in the Jordan Valley destroying in some places the entire crop (several dunums of peas were destroyed at Tabgha in October, 1936). The maggots attack the roots and then pupate inside of the lower part of the stem causing pathologic swelling and shrivelling of the attacked plants.

Adults hatched in the Jordan Valley towards the end of October.

Neue Heteropteren aus Aegypten

(mit 6 Abbildungen)

von Hakan Lindberg (Helsingfors)

1. Coreidae

Riptortus aegyptiacus nov. spec.

(Fig. 1)

Körper heller oder dunkler braun, mit feinen, anliegenden, weissen, gekrümmten Haaren bedeckt.

Kopf etwas dreieckig, so lang wie über den Augen breit. 1. Antennenglied braun, 2. und 3. hellbraun mit dunkelbrauner Spitze. 4. Glied hellbraun, äusserste Basis schwarz. Beim ♂ ist das 1. Antennenglied länger beim ♀ kürzer. als die Kopfbreite an den Augen. Das 2. und 3. Glied sind kürzer als das 1., das 2. etwas länger als das 3., das 4. etwa so lang wie das 2. und 3. zusammen. Rostrum bis zu den Mittelhüften reichend. Kopfseiten sowie Seiten der Thoraxsegmente bei einigen Stücken (var. *vittatus* nov.) mit hellen, gelblichen und etwas länglichen Flecken. Die die Flecken umgebenden Teile der Thoraxsegmente sind dunkelbraun bis schwarz. Bei anderen Stücken zieht sich eine sehr undeutliche hellere Binde über den Kopf und die Thoraxseiten.

Pronotum nach vorn verengt, so lang wie am Hinterrande breit. Hinterecken des Pronotum mit kleinem Zahn, Hinterrand wellenförmig. Schildchen mit dem Pronotum sowie mit den Flügeldecken gleichfarbig, Spitze gelblich.

Bauch bei var. *vittatus* an den Seiten gelblich, an der Basis mit einem medianen, zungenförmigen, gelblichen Fleck. Als Fortsetzung desselben treten gelbe Makeln am Grunde des 7. und 8. Bauchsegmentes auf. Bei der Hauptform ist der Bauch mehr oder weniger einfarbig braun. Rücken sowie Connexivum gelb, Hinterecken des 7. und 8. Hinterleibssegmentes mit kleinem, schwarzem Fleck.

Beine dunkler oder heller braun, Schienen an der Basis und Spitze dunkelbraun, sonst hellbraun. Tarsenglieder ganz dunkelbraun oder mit dunkelbraunen Spitzen. Vorderbeine unbewehrt. Die etwas gekrümmte Hinterschiene an der Innenseite der Spitze mit kleinem, spitzem Dorn. Die bei beiden Geschlechtern gleich stark verdickten Hinterschenkel sind an der Innenseite mit einer Reihe von grösseren und kleineren Dornen versehen.

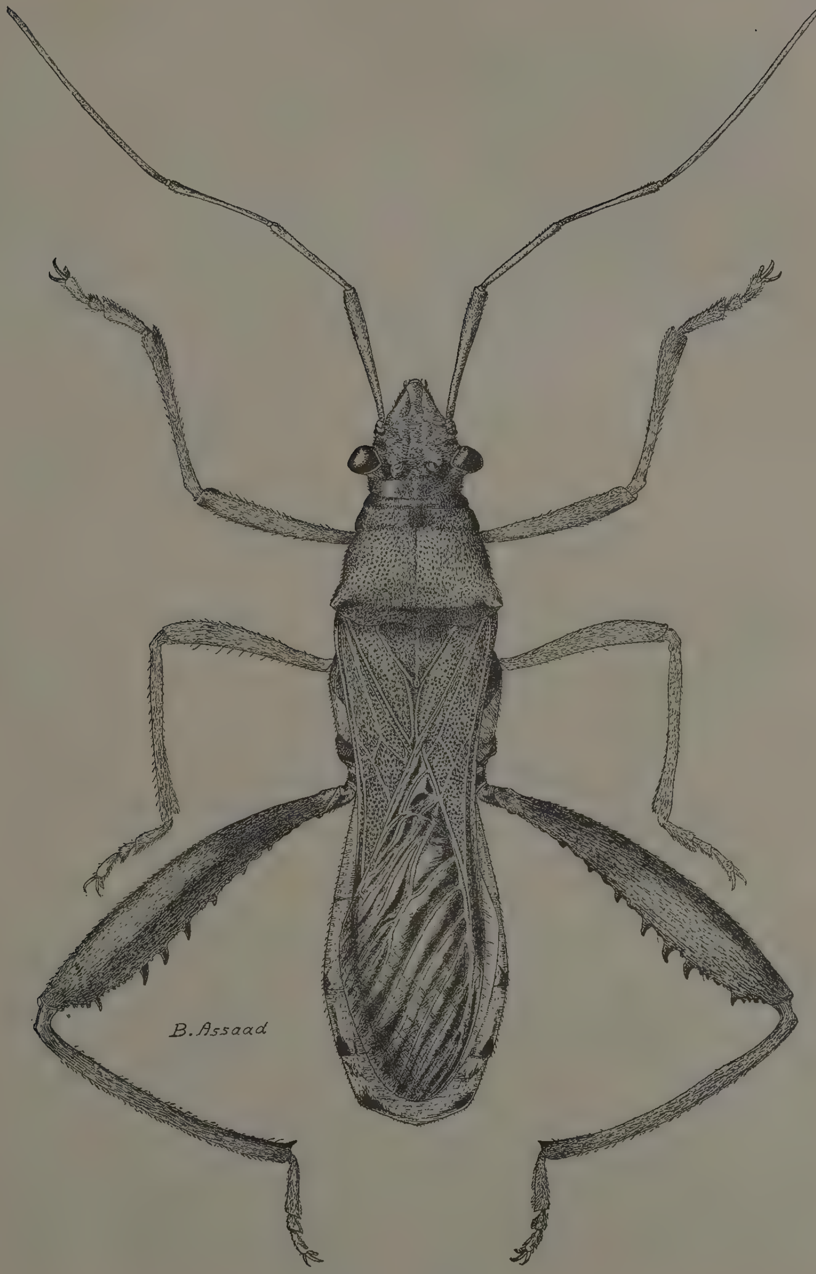

Fig. 1. — *Riptortus ægyptiacus* nov. spec.

Die grösseren sind etwa 7 an der Zahl. Zwischen dem letzten und dem vorletzten Dorn stehen etwa 6 kleine Dornen.

Länge 16,7 mm., Breite 3 mm..

Holotype in der Sammlung des Ackerbauministeriums in Kairo; Paratypen ebenso sowie in meiner Sammlung.

Von der bisher einzigen paläarktischen Art, *Riptortus clavatus* Thunb. aus Japan unterscheidet sich diese neue Art durch helleren und kleineren Körper sowie durch den Mangel eines mächtigen Zahnes der Hinterecken des Pronotums. *Riptortus aegyptiacus* scheint den aethiopischen Arten *flavolineatus* Stål, *dentipes* Fabr. und *flavivittatus* Stål am nächsten zu stehen. Mit der letztgenannten ist sie sehr nahe verwandt, sie hat wie diese schwach ausgebildete Zähne an den Hinterecken des Pronotum, unterscheidet sich aber von ihnen hinsichtlich der Farbe.

Fundorte: Abu Sueir, 20.9.32, an *Alhagi* (leg. Selim), 5 Stück. — Borgash, 2.8.34, an Gramineen (Min. Agric.), 1 St. — Helouan, 21.7.33 (Min. Agric.), 1 St.

Nariscus cinctiventris Germ.

(Silb. Rev. ent. V, S. 152. 71 (1837))

Da diese Art nicht früher aus dem paläarktischen Gebiet bekannt gewesen ist, gebe ich hier eine auf die vorliegenden 3 Stücke gegründete Beschreibung derselben:

Hellgraugelb (♂) oder grau (♀) mit kleineren schwarzen Flecken. Körper langgestreckt, parallelseitig, von sehr kurzen, anliegenden Haaren bedeckt. Oberseite mit Ausnahme des Kopfes und des Vorderteils des Pronotums stark punktiert, bei dunkleren Stücken (♀♀) sind die Punkte schwarz.

Kopf länglich dreieckig, 1/5 länger als hinten an den Augen breit. Der Abstand zwischen den Ocellen doppelt so lang wie der Abstad zwischen einer Ocelle und dem Auge.

Pronotum ein wenig länger als der Kopf, 1/4 länger als breit, an den Seiten mit unpunktiertem, schmalem, hellem Band. Der Vorderteil unpunktiert, hinterer Teil gewölbt und stark punktiert. In der Mediane ein niedriger Kiel. Hinterrand wellenförmig gebuchtet.

Flügeldecken gelb, mit schwarzbraunen oder gelben Punkten, die deutlich abgesetzten Adern unpunktiert. Seitenränder etwas gebogen, sodass die Flügeldecken im mittleren Teil schmäler sind als an der Basis und Spitze. Membran durchsichtig, mit dicht gestellten, braunen Adern.

Seiten der Thoraxsegmente sowie des Hinterleibes gelblichgrau. Unterseite des Kopfes und des Pro- und Mesothorax schwarz. Am Bauche jederseits der Mediane beim ♀ ein schwarzer Längsstrich. Beim ♂ fehlt dieser Strich fast gänzlich. Medianer Teil des Rückens sowie Hinterecken der Rückensegmente schwarz. Bei den heller gefärbten ♂♂ ist die dunkle Farbe schwach entwickelt.

Beine mit graugelblicher Grundfarbe und schwarzen, kurzen Borsten. Innenseite der Hinterschenkel mit etwa 12 grösseren und mehreren kleineren kegelförmigen Dornen. Die Dornen gelblich mit schwarzer Spitze. Innenseite des Spitzenteiles der Hinterschiene dicht mit schwarzen und schwarzbraunen Haaren bedeckt. Die Haare sind 1,5 mal so lang wie die Schiene dick. In der behaarten Zone liegen zwei Doppelreihen von im ganzen 8 schräg nach hinten gerichteten, spitzen und ziemlich langen Dornen. Dornen am Grunde gelb, an der Spitze schwarz. Beim ♂ ist der Hinterschenkel etwas gebogen und die Spitzenhälfte stark verdickt. Auf der Aussenseite liegt ziemlich nahe der Spitze ein scharfer, langer Dorn und auf derselben Seite der Hinterschienen-Basis ein kurzer, schwarzer Dorn. 1. Glied der Hintertarsen beinahe doppelt so lang wie das 2. und 3. zusammengenommen. 1. Glied gelblich, nur die äusserste Spitze schwarz. Bei den ♀♀ treten zwei helle Binden auf den Hinterbeinen (im Spitzenteil des Schenkels und am Grunde der Schiene) deutlich hervor.

Länge 12,5 - 13,5 mm., Breite 2,3 - 2,5 mm.

Nariscus cinctiventris, auf welcher Art Stäl die Gattung *Nariscus* aufgestellt hat, wurde früher aus der äthiopischen Region angeführt (Gabon, Kapland).

Fundorte: Kerdasa, 23.11.32, an *Sesbania* (Min. Agric.), 2 Stück. — Kharga Oase, 11.3.34 (leg. Dr. M. Kamal), 1 St. — Nahia, 14.9.33 (Min. Agric.), 1 St.

2. Lygaeidae.

Apterola angusticollis nov. spec.

(Fig. 2)

Grundfarbe hellgelbbraun, Teile des Körpers schwarz. Oberseite fein quer-gerunzelt.

Kopf schwarz, dreieckig, etwas zugespitzt, ein wenig länger als das Pronotum. Augen dunkelrot. 1. Antennenglied nicht ganz die Spitze des Kopfes erreichend, schwarz, Spitze gelb. 2. Glied einfarbig hellgelb, 3. Glied an der Basis rostbraun, sonst gelb. 4. Glied schmal spindelförmig, zugespitzt, mit schwachem, rostbraunem Anfluge. Glieder 2 und 4 gleichlang, das 3. um ein Drittel kürzer. Rostrum schwarz, ein wenig über die Hinterhüften reichend.

Am Vorderrand des Prothorax ein gelblicher Saum, der etwa ein Viertel des Gliedes einnimmt, übriger Teil schwarz, Seitenränder und ein Mediankiel jedoch schmal rostbraun. Der letztere erreicht nicht den gelben Vorderteil des Pronotums.

Schildchen halb so lang wie das Pronotum, Spitze abgerundet, Basis des Schildchens schwarz, Spitze sowie Mediankiel gelb. Flügelrudimente beim

vorliegenden Stück sehr kurz, nicht ganz den Hinterrand des 1. Tergites erreichend, etwa dreieckig, gelblichweiss. Innenrand schwach eingebuchtet.

Hinterleib langgestreckt, oval, schwarz und gelb. Connexivum gelb, nur die Vorderecken der Segmente schwarz. Rücken schwarz. mit unscharf begrenzten bräunlichen Flecken am Rande des Connexivums.

Schenkel dunkel rostbraun, Spitze heller, Schiene sowie 1. und 2. Tarsenglied gelb, 3. Tarsenglied samt den Klauen rostbraun.

Länge 4,5 mm., Breite 1,8 mm.

Fig. 2. — *Apterola angusticollis* nov. spec.

Holotype (♂) in der Sammlung des Ackerbauministeriums, Kairo.

Die neue *Apterola*-Art unterscheidet sich in mehreren Beziehungen von den bisher bekannten Arten der Gattung. Schon durch die Farbe ist sie gut von den rotgefärbten Arten *rubicunda* Stål (Syrien), *pedestris* Stål (Mittelmeergebiet) und *Lowni* Saund. (Syrien, Turkestan, Kaukasien) getrennt, sowohl durch die Farbe wie die Grösse und Körperform ferner von der kleinen Art *Apterola iberica* Horv. (Spanien).

Fundort: Helouan, 23.8.35 (Min. Agric.), 1 Stück.

Cymus minutus nov. spec.

Körper länglich oval, einfarbig bleichgelb, Abdomen im Leben grünlich, dicht und grob hellbraun punktiert. In den Punkten kurze gelbliche Haare.

Kopf zugespitzt, Augen dunkelrot. 1. Antennenglied birnförmig, nicht die Spitze des Kopfes erreichend, 2. Glied hell gelblichweiss, doppelt so lang wie das 1., an der Spitze etwas verdickt; 3. Glied von derselben Dicke wie das 2., ein Viertel länger als dieses. 4. Glied spindelförmig, dicht behaart.

Seitenränder des Pronotum beinahe gerade, gleich vor der Mitte sehr schwach ausgebuchtet, in der Mediane des Pronotum ein unpunktierter, heller Kiel, der etwa in der Mitte erlischt. Hinterrand des Pronotum gerade; hinterer Teil des Pronotum ziemlich stark gewölbt. Auf dem Schildchen ein schmaler, aber ganz deutlicher, unpunktierter Wulst, der wenigstens bei einigen Stücken bis zur Basis reicht.

Flügeldecken hell, äusserste Spitze des 3. Tarsengliedes sowie Klauen rostbraun.

Unterseite ganz gelb.

Länge 2,8 mm., Breite 1 mm.

Holotype und Paratypen in der Sammlung des Ackerbauministeriums, Kairo; Paratypen auch in meiner Sammlung.

Die neue Art steht der gemeinen europäischen Art *glandicolor* am nächsten. Sie unterscheidet sich von dieser durch ihre viel kleinere Körpergrösse (*glandicolor* 4,5-5 mm.), ganz helle Körperfarbe (die Spitze des Coriums jedoch mit dunklem Fleck) sowie durch einen schmalen Medianwulst auf dem Schildchen. Die aus Transkaspien aufgestellte Art *Cymus simplex* Horv., die ich nur nach der Beschreibung kenne, unterscheidet sich von *Cymus minutus* durch einen dunklen Fleck auf der Spitze des Clavus, durch grösseren Körper und durch Mangel des Medianwulstes auf Pronotum und Schildchen. Von *Cymus obliquus* Horv. ist die neue Art durch kleineren und schmäleren Körper sowie die Körperfarbe leicht zu trennen.

Fundorte: Ismailia, 24.8.32 (leg. Selim). — Faied, 11.8.32, an Gräsern (leg. Kasim). — Gebel Asfar, 18.11.30 (leg. Selim).

Artheneis aegyptiaca nov. spec.

Körper hell gelblichweiss mit mehr weniger ausgebreiteten, dunkleren Flecken.

Kopf einfarbig gelb, Augen rot; Antennen gelb, auch das 1. Glied, Basis des 2. und 3. Gliedes innen sehr fein schwarz gerandet; 4. Glied braun, Spitzenteil dunkelbraun; die zwei letzten Glieder gleich lang, 2. Glied etwas länger als 3. und 4.

Pronotum einfarbig gelb oder mit brauner Schattierung im hinteren Teil. Jederseits einer niedrigen Medianfurche im Vorderteil des Pronotum befindet sich ein niedriger Kiel. Bei dunkleren Stücken liegt ein kurzer Längsfleck auf der Aussenseite der Kiele. An den Seiten des Pronotum sind die Ränder schmal, der ganzen Länge nach gleichbreit, blattartig und unpunktiert. Pronotum-Fläche stark punktiert. Schildchen mit dickem, weis-

sem, V-förmigem, unpunktiertem Wulst, der fast das ganze Schildchen bedeckt. Nur der mediane Teil der Basis niedrig, punktiert.

Flügeldecken bei den meisten Stücken einfarbig gelb, bei einigen ist der hintere Teil des Corium angedunkelt. Membran einfarbig, bei dunkleren Stücken eine kleine Makel in der Nähe der Spitze.

Abdomen hell gelblichweiss. Die dunkleren Stücke zeigen mehr oder weniger ausgebreitete Flecke an den Vorderecken der Segmente sowie am Bauch, jederseits der Mediane.

Beine auch bei dunkleren Stücken gelb; äusserste Spitze der Schiene sowie der Tarsenglieder angedunkelt. Klauen dunkelbraun.

Länge 2,6 mm., Breite 1,2 mm.

Holotype und Paratypen in der Sammlung des Ackerbauministeriums, Kairo, Paratypen auch in meiner Sammlung.

Die einander ziemlich ähnlichen Arten der Gattung *Artheneis* unterscheiden sich von einander z.B. im Bau des Schildchens. Während *Artheneis alutacea* Fieb. (aus dem Mittelmeergebeit, Südrussland, Kaukasien und Turkestan) und *Artheneis hircanica* Kol. (Südrussland, Kaukasien, Turkestan) nur mit kallösem Buckel in den Grundwinkeln des Schildchens (selten mit einem Buckel an der Spitze) versehen sind, haben *Artheneis foveolata* Spin. (Mittelmeergebeit, Südrussland, Turkestan) und *aegyptiaca* m. einen V-förmigen Buckel, der einen grösseren Teil des Schildchens einnimmt. Bei ersterer Art ist der Buckel ziemlich schmal, kielförmig, bei *aegyptiaca* breiter und mehr stumpf wulstförmig. Sie treten bei der letztgenannten Art auch für das unbewaffnete Augen deutlich hervor. Auch im übrigen steht die neue Art der *foveolata* am nächsten. Sie unterscheidet sich hievon noch durch kleinere Körpergrösse und hellere Farbe. So sind 1. Antennenglied und Schenkel bei meiner Art stets hell. Noch heller und kleiner ist die kürzlich aus der Oasis Giarabub beschriebene *Artheneis chlorotica* Bergevin. Diese besitzt einen ganz hellen Körper, längere und schmälere, fadenförmige Antennen, das 2. Glied der letzteren ist verhältnismässig lang, doppelt so lang wie das 3.

Fundorte: Boulaq (Kharga Oase), 14.3.34 (leg. H. Priesner). — Tala, 27.9.35 (leg. Moussa). — Wadi Mehalla, 19.4.33 (leg. Kassim). — Wadi Umm-Elek, 17.11.34 (Min. Agric.). — Helwan, 29.10.29, on *Tamarix;* 14.2.30, in nest of *Gerbillus* (leg. Farag).

Stenophthalmicus hirticornis nov. spec.

(Fig. 3)

Langgestreckt, parallelseitig, gelbbraun, Oberseite fast ganz flach, kurz behaart.

Kopf fast unpunktiert, dreieckig. Augen sowie Ocellen rötlichgelb, Kopf zwischen den Augen so breit wie das Pronotum.

Pronotum quadratisch. Seitenränder im hinteren Teil sehr schwach aus-

geschweift. Punktierung sehr spärlich, etwa 12-13 Punkte in der Reihe zwischen den Seitenrändern. Im vorderen Teil zwei niedrige, kallöse, unpunktierte Flächen. Schildchen etwas dichter punktiert als das Pronotum, die Medianlinie unpunktiert, aber keine Kiele bildend.

3

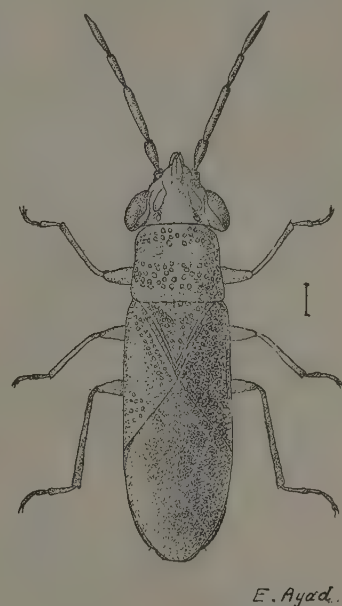

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Fig. 3. — *Stenophthalmicus hirticornis* nov. spec.
Fig. 4. — *Stenophthalmicus biskrensis* Put.

Flügeldecken zwischen den Punktreihen sehr schwach und weitläufig punktiert. Beine gelb, medianer Teil der Rückenseite angedunkelt.

Rostrum bis zu den Hinterhüften reichend, die zwei ersten Glieder gleichlang, 4. Glied 2/3 der Länge des 3., die zwei letztgenannten Glieder zusammen so lang wie das 1. und 2. zusammen. Antennen rostbraun, verhältnismässig dick, mit schwarzer Behaarung. 1. Glied half so lang wie 2., das 4. so lang wie das 2., das 3. etwas kürzer.

Holotype und Paratypen in der Sammlung des Ackerbauministeriums, Kairo, Paratypen auch in meiner Sammlung.

Die neue Art ist wegen der hellen Farbe der Art *Stenophthalmicus biskrensis* Put. (Fig. 4) (Algerien) ähnlich. Sie unterscheidet sich jedoch von

dieser u.a. durch die dicken, ziemlich dunkel gefärbten und stark behaarten Antennen. Betreffs der Farbe sowie der Punktierung und der Grösse ist sie von *Stenophthalmicus fayoumensis* Costa (Aegypten), *mixtus* Mont. (Tunis) und *tingitanus* Fairm. (Marokko) verschieden.

Fundorte : Mansouriah, 11.2.34, an Halfa-Gras. — Borgash, 31.1.34, an Halfa-Gras. — Magadla, 1.11.34, an Sycamore. — Kerdasa, 9.8.35, Kafr Hakim, 22.9.35, Manshiet Radwan, an Halfa-Gras (coll. Min. Agric.).

3. Miridae.

Von der Gattung *Nasocoris* Reuter (Fig. 5 a.b.c.d.) sind bisher 3 Arten beschrieben worden. Der Typus der Gattung, *Nasocoris argyrotrichus* Reuter, wurde von Reuter auf Grund von Stücken aus Südrussland und Turkestan aufgestellt. Später wurden die Arten *Nasocoris platycranoides* Mont. aus Algerien und *Nasocoris ephedrae* Reuter aus Spanien (auf *Ephedra nebrodensis*) beschrieben. Typen aller drei Arten befinden sich in O. M. Reuters Sammlung. Die letzgenannte Art habe ich in Marokko auf *Ephedra cossonii* gefunden. In der Sammlung des ägyptischen Ackerbauministeriums stecken mehrere Stücke einer schönen, neuen Art, von Dr. H. Priesner gesammelt, die ich *albipennis* nenne. Unten gebe ich eine Bestimmungstabelle der *Nasocoris*-Arten. Der Bau der männlichen Genitalanhänge bietet gute unterscheidende Merkmale.

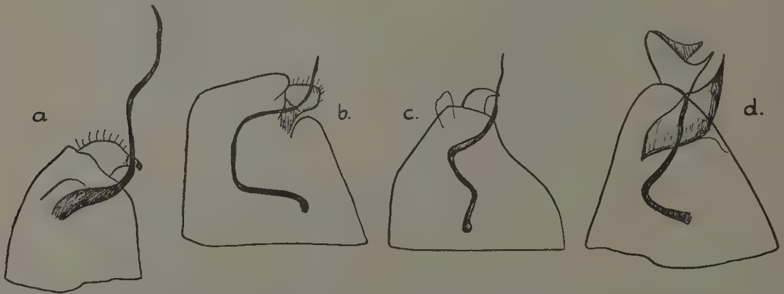


Fig. 5. — a. Genitalsegment bei *Nasocoris argyrotrichus* Reut.; b. *Nasocoris albipennis* nov. spec.; c. *Nasocoris ephedrae* Reut.; d. *Nasocoris platycranoides* Mont.

1 (2) Schiene dunkel punktiert, Schenkel etwas angedunkelt, im Spitzenteil hell rostgelb. 1. Antennenglied ziemlich dick, rostgelb, dunkel behaart. Hinterteil des Kopfes sowie Pronotum dunkelbraun, Medianteil der Flügeldecken angedunkelt. Linker Griffel des ♂ klein, klauenförmig (Fig. 5 c). Kleine Art : 3,5 - 3,75 mm. Spanien, Marokko .... **Nasocoris ephedrae Reut.**

2 (1) Schiene einfarbig hellgelb.

3 (6) 1. Antennenglied sowie Flügeldecken und Beine nur mit gelben Härchen besetzt.

4 (5) 1. Antennenglied rostbraun, übrige Glieder sowie die Beine hellgelb. Schenkel höchstens mit schwacher, rötlicher Färbung an der Basis. Kopf rostbraun mit gelblicher Behaarung. Pronotum rötlich, Flügeldecken einfarbig gelblich. Cuneus hellgelb, Membran etwas angedunkelt. Linker Griffel des ♂ ziemlich gross, lappenförmig, mit kleiner, gebogener Spitze (Fig. 5 a). — Länge 3,75-4,3 mm. — Südrussland, Turkestan .... **Nasocoris argyrotrichus Reut.**

5 (4) 1. Antennenglied, Beine, Pronotum und Flügeldecken gelblichweiss. Kopf gelblichweiss. Cuneus mit dem übrigen Teil der Decken gleichfarbig. Linker Griffel lappenförmig, stumpf, ohne zugespitzen Anhang (Fig. 5 b). — Länge : 3,75-4,3 mm. — Aegypten (Sinai) .... **Nasocoris albipennis nov. spec.**

6 (3) 1. Antennenglied zowie Beine und Decken mit gelben und schwarzen Haaren bestetzt. Pronotum weisslichgelb, mit rötlichen Seitenrändern und Hinterrand. Pronotum länger und weniger quer als bei den übrigen Arten. Linker Griffel des ♂ aus zwei Teilen bestehend, einem lappenförmigen und einem kleinen spitzen Teil (Fig. 5 d). — Länge 4,25-4,5 mm. — Algerien .... **Nasocoris platycranoides Mont.**

Nasocoris albipennis nov. spec.

Kopf weiss, Clypeus sowie Stirn und Seiten des Scheitels mit weissen Haaren besetzt. Am Hinterrand jederseits der Mediane ein kleiner gelblichroter Fleck. Augen braun, bei den vorliegenden Stücken (alle ♂♂) beinahe so breit wie der Scheitel zwischen den Augen. Rostrum weisslich, an der Spitze angedunkelt. Antennen gelblich, 1. Glied mit weisslichem Anflug, sehr dicht mit weissen Haaren besetzt. Auf der Aussenseite sind die Haare schwach angedunkelt. 2. Antennenglied etwa zweimal so lang wie das 1., das 3. etwas kürzer als das 2., das 4. etwas kürzer als das 1.

Pronotum mit geschweiften Seiten, quer, am Hinterrande doppelt so breit wie am Vorderrande. Färbung matt graubraun, der vorderste Teil etwas rostfarbig braun, mit weissen, gekrümmten, etwas schuppenförmigen und leicht abfallenden Haaren, die in unterbrochenen Reihen angeordnet sind.

Schildchen graubraun, mit weissen schuppenförmigen Haaren, in der Mitte mit querer Einbuchtung. Spitze weisslich.

Halbdecken weiss, auf der Basis des Clavus schuppenartige Haare, sonst spärlich mit weissen, feinen Haaren besetzt. Membran grau, dunkel rauch-

farbig. Die Naht swischen Corium und Membran etwas angedunkelt. Prosternum weiss. Unterseite im übrigen dunkelbraun bis hell rostbraun. Rücken dunkelrostbraun. Beine weisslichgelb, auf der Unterseite dicht weiss behaart.

Linker Griffel des ♂ lappenförmig, stumpf, ohne zugespitzten Anhang (Fig. 5 b).

Fundort: Sinai (Wadi Feiran), an *Haloxylon schweinfurthi*, 17.5.34, leg. Prof. Dr. H. Priesner.

Tuponia tamaricicola nov. spec.

(Fig. 6)

Körper weisslich, teilweise mit orangegelbem Anflug. Auf den Halbdecken mehr oder weniger verbreitete rote Zeichnungen. Oberseite mit kurzen, krummen weissen Haaren besetzt.

Kopf bleichgelb mit orangegelbem Querfleck zwischen den Augen. Augen schwarz, beim ♂ ist der Scheitel hinten doppelt so breit wie das Auge,

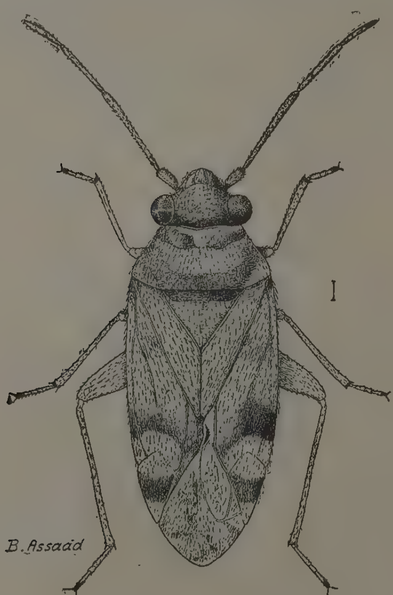


Fig. 6. — *Tuponia tamaricicola* nov. spec.

beim ♀ weniger breit, mehr gewölbt. Antennen gelblich, 2. Glied beim ♀ ein wenig länger, beim ♂ etwas kürzer als der Kopf über den Augen.

Pronotum weisslich, im Vorderteil mit orangegelber, gebogener Quer-

binde. Hinterrand schwach gebogen, Seitenränder gerade. Schildchen weisslich, im vorderen Abschnitt mit schwachen orangegelben Flecken an der Spitze und im medianen Teil der Basis.

Halbdecken weisslich mit schwachem roten Schein. Im hinteren Abschnitt des Corium eine rote Querbinde, von welcher bei einigen Stücken rötliche Striche nach vorn ziehen; so ist z.B. die Clavus-Ader rot. Die rote Querbinde ist am Seitenrande des Coriums am deutlichsten ausgebildet. Hinterende dieses Teiles weiss. In der Mitte des Cuneus ein etwa dreieckiger roter Fleck, Spitze sowie Basis des Cuneus durchsichtig weiss. Membran teilweise rauchfarbig, Membranadern orange.

Beine gelb, teilweise mit grünem Schein. Hinterschiene mit etwa 8 weissen, feinen Borsten in einer Reihe. Spitze der Schiene sowie Spitze des 3. Tarsengliedes und Klauen schwach angedunkelt.

Länge 3 mm., Breite 1,1 mm.

Holotype in der Sammlung des Ackerbauministeriums, Paratypen ebenso und in meiner Sammlung.

In der Bestimmungstabelle von Reuter (Hemipt. Gymnoc. Europ. 3., p. 505) kommt die neue Art wegen der hellen Farbe und der hellen (weisslichen) Borsten auf den Schienen in die Nähe von *Tuponia pallida* Reuter zu stehen. In der Färbung ähnelt sie am meisten der früher als eine Varietät von *tamaricis* Perr. aufgefassten, aus Algerien sowie den östlichen Mittelmeerländern bekannten *Tuponia elegans* Jak. Diese ist aber durch eine rote Querbinde über den Basalteil des Coriums sowie eine solche über den Spizteteil des Coriums und das Fehlen der roten Flecke auf dem Cuneus gekennzeichnet. Von der weitverbreiteten, gleichfalls auf *Tamarix* lebenden *Tuponia tamaricis* ist sie durch geringere Körpergrösse, ganz andersartige Färbung, sowie durch die hellen Borsten auf den Schienen unterschieden.

Fundort: Sinai (El-Ariesch), 5.5.35, an *Tamarix* (leg. Prof. Dr. H. Priesner).

Séance du 16 Février 1938

Présidence de S.E. Fouad Abaza Pacha

Dons à la Bibliothèque :

La Société a reçu les ouvrages ci-dessous mentionnés :

1° De Monsieur le Docteur N. S. Royston Malœuf, de New Haven (Etats-Unis d'Amérique) : un separata de ses récents travaux intitulés (a) Studies on the Respiration (and Osmoregulation) of Animals, parties I-II, extrait de Zeitschrift für vergleichende Physiologie, Vol. 25, fasc. 1, pp. 1-42 ; (b) The Energy Source of the Mussel (*Mytilus edulis*) during oxygen lack, extrait de Zeitschrift für vergleichende Physiologie, Vol. 25, fasc. 1, pp. 43-46 ; (c) The Biology of Light-Production among the Arthropods, extrait de Science Progress, No. 126, Octobre 1937, pp. 228-245 ; (d) The Permeability of the integument of the Crayfish (*Cambarus bartoni*) to Water and Electrolytes, extrait de Biologischen Zentralblatt, Vol. 57, fasc. 5-6, 1937, pp. 282-287.

2° De Monsieur le Docteur L. Keimer, du Caire : un exemplaire de son ouvrage « Insectes de l'Egypte ancienne », études égyptologiques publiées de 1931 à 1937 dans les Annales du Service des Antiquités de l'Egypte, Le Caire, 1938.

Le Conseil remercie.

Admissions :

Sont admis à faire partie de la Société en qualité des membres titulaires :

Monsieur Mohamed Aly Ismail El Shafei, du Caire, proposé par Messieurs le Docteur Hamed Seleem Soliman et A. Alfieri.

Monsieur G. Runkewitz, de Luxor, proposé par Messieurs Edgard Chakour et A. Alfieri.

Monsieur J. Ghesquière, de Bruxelles, Belgique.

Directorate of Agriculture, Ministry of Economics and Communications, Baghdad, Irak, proposé par Messieurs le Professeur H. C. Efflatoun Bey et A. Alfieri.

Echanges :

L'échange des publications est établi avec les Institutions suivantes :

1° Associcao da Filosofia Natural, na Faculdade de Ciencias, Porto, Portugal.

2° Bibliothèque de la Société Zoologique Tchécoslovaque, Institut de Zoologie, Prague, Tchécoslovaquie.

3° Mushi, Entomological Laboratory, Department of Agriculture, Kyushu Imperial University, Fukuoka, Japon.

Was ist *Arctocoris tomentosus* Germ.?

(Hemiptera-Heteroptera: Scutellerinae)

Zugleich ein Beitrag zur ägyptischen Wanzenfauna

(mit 4 Abbildungen)

von K. Schmidt, Fürth, Bayern

Schouteden spricht in der Faune entomologique de l'Afrique tropicale Bd. I, 1903, p. 89 mit guten Gründen die Vermutung aus, dass *Arctocoris tomentosus* Germ. zum Genus *Odontoscelis* zu stellen ist. Oshanin hingegen führt in seinem Katalog der paläarkt. Hemipteren, Berlin 1912, diese Art als *Irochrotus* auf. H. Dr. Hedicke, Berlin, forschte auf meinen Wunsch nach dem Verbleib der Type der Germarschen Art und teilte mir mit, dass sie nicht mehr vorhanden ist. H. Dr. Hedicke danke ich auch an dieser Stelle bestens für seine stundenlangen, leider ergebnislosen Bemühungen.

Nun habe ich von dem Museo entomologico « Pietro Rossi », Duino (Trieste), 1 ♂, 6 ♀♀ einer *Odontoscelis*-Art zur Bestimmung bekommen, die ich für *Arctocoris tomentosus* Germ. halte. Auf den Fundortzetteln dieser Tiere steht: Cairo, W. Hof, 22.1.1933, Schatzmayr-Koch und Helwan, Eg., 18.8.33, W. Wittmer. Sie stimmen in Form und Grösse und 1 Exemplar auch in der Farbe mit der Fig. 488 der Tab. CLVI in Herrich-Schäffers Wanzenartigen Insekten, 5. Band, Nürnberg 1839, ebenso überein wie mit der Germarschen Beschreibung und den Herrich-Schäfferschen Zusätzen. Auf der genannten Tafel sind nebeneinander abgebildet *Arctocoris plagiatus* Germ. (= *Odontoscelis dorsalis* F.) als Fig. 487 und *Arctocoris tomentosus* Germ. als Fig. 488 und darunter stehen *Arctocoris villosus* (= *Irochrotus lanatus* Pall.) als Fig. 489 und *lanatus* Pall. als Fig. 490. Während bei *villosus* in der Abbildung eine deutliche seitliche Einbuchtung des Pronotums und 2 diese Einschnürung verdeutlichende Querstriche zu sehen sind und während das Pronotum des *A. lanatus* Pall. mit tiefen Querfurchen gezeichnet ist, lässt sich bei den Figuren 487 und 488 nichts Derartiges erkennen. Wenn auch das für *Irochrotus* kennzeichnende Merkmal der Pronotumeinschnürung nicht ausdrücklich von Herrich-Schäffer vermerkt ist, so stellt er in seiner kurzen Bestimmungstabelle *A. tomentosus* Germ. zu den « filzartig behaarten » *fuliginosus* L. und *plagiatus* Germ. (= *dorsalis* F.) und nicht zu der « langzottig behaarten » Gruppe des *villosus* H.S. und *lanatus* Pall. Berücksichtigt man dazu die Gründe Schoutedens

(loc. cit.), so besteht meines Erachtens keine Veranlassung, *Arctocoris tomentosus* Germ. noch bei *Irochrotus* zu lassen.

Ich gebe im folgenden eine ausführliche Beschreibung der ägyptischen Tiere, die, wie ich glaube, dem aus Dongola beschriebenen *Arctocoris* (=*Odontoscelis*) *tomentosus* Germ. entsprechen.

Odontoscelis tomentosus Germ.

Länglich eiförmig, der Hinterleib auch beim ♀ nach rückwärts nur sehr wenig verbreitert, so dass seine Seiten fast parallel sind, hinten regelmässig bis etwas schmal abgerundet. Grundfarbe glänzend schwarz, spärlich und gleichmässig punktiert. Dicht bedeckt mit anliegenden kurzen, wirren, stark gekrümmten, nicht seidig glänzenden Haaren, die oft mit einer weissen Kruste dicht überzogen sind und die Staub und feine Sandkörnchen festhalten, so dass das Tier weisslichgrau erscheint und von der Grundfarbe, der Punktierung und den Narben auf dem Pronotum nichts zu sehen ist. Fehlt dieser Ueberzug, so erscheinen die feinen Wirrhaare braun. Diese brechen wahrscheinlich leicht aus; denn bei einem untersuchten ♀ sind sie nur auf dem hinteren Teil des Schildchens sichtbar. Herrich-Schäffer hat anscheinend ein unverkrustetes Tier als Vorlage für die Figur 488 vor sich gehabt. Zwischen dem Haarfilz ragen kurze, hellbraune, halbaufrechte, an der Spitze oft nach hinten gebogene kurze Borsten hervor. Nach den Körperrändern zu werden diese Borsten länger und erreichen die Länge der beiden letzten Fühlerglieder zusammen. Am Kopfrand und an den inneren Augenrändern stehen einige lange, steife, hellbraune Borsten. Unterseits schwarz, vorn zerstreut, nach hinten zu und nach den Seiten hin, so wie oberseits, dichter und länger fein braunbehaart. Die feinen Haare zuweilen weisslich inkrustiert. Brustplatten kräftig eingedrückt punktiert, ebenso die ersten Hinterleibsringe, der Rest des Bauches ganz fein nadelrissig eingestochen.

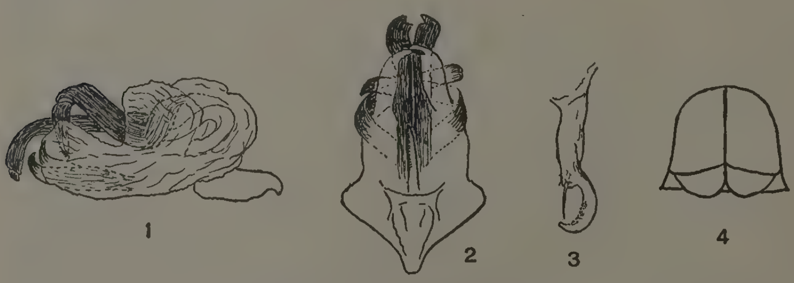
Kopf samt den Augen, von oben gesehen, 2 2/3 mal so breit wie lang, von vorne gesehen um 1/4 kürzer als breit, vor den Augen ein klein wenig erweitert, dann breit gerundet; von der Seite betrachtet, in einem Bogen stark nach unten geneigt. Tylus gleichbreit, seine Furchen bis zur Höhe der Ocellen reichend und hinten etwas auseinanderlaufend, frei, die Wangen nicht überragend. Augen weniger vorstehend als bei *Odontoscelis dorsalis* F., seitlich gesehen, nierenförmig; Ocellen in der Mitte zwischen Tylusfurche und innerem Augenrand. Wangenplatten als scharfe Ecken etwas über die Tylusspitze nach unten hinausragend, vorne eckig, einen Winkel von etwa 80° bildend, nach hinten ganz wenig höher werdend und zuletzt bogig gerundet. Die Fühlerlängen verhalten sich wie 16 (Grundglied) 8 : 5 : 7 : 11 : Fühler mit einigen, die beiden Endglieder mit mehreren feinen, abstehenden, hellen Borsten, die kürzer sind als der Durchmesser des 4. Gliedes. Das 5. Glied spindelförmig und dicker als die übrigen, 4. Glied verkehrt kegelförmig, beide

mit kurzem Stielchen, 3. Glied nach der Spitze zu verdickt, am Grunde so dick wie das 2. Glied. Entweder alle Fühlerglieder hellgelb bis hellbraun oder nur das 5. Glied dunkler. Rüssel mit dem 1. Glied nicht ganz bis zum Kopfende, mit der Spitze fast an die Hinterhüften hin reichend.

Pronotum: Seine mittlere Länge verhält sich zur vorderen und hinteren Breite wie 7:10:14 (durchschnittlich). Sein Vorderrand beiderseits je um die Entfernung vom äusseren Augenrand bis zur Ocelle breiter als der Kopf, hinter dem Kopf sehr flach gebuchtet, in der Mitte sogar fast ein wenig nach vorne gebogen. Vorderwinkel gerundet, nicht vorgezogen, ihre Verbindungslinie hinter den Augen verlaufend. Seitenränder bis zum bogigen Vorderwinkel fast gerade und sehr wenig zusammenlaufend, zu Beginn des hinteren Drittels eingekerbt. Hinterrand in der Mitte weiter nach hinten gebogen als der Vorderrand eingebuchtet ist, so dass die Seitenränder kürzer sind als die Mittellänge des Pronotums. Narben und seitliche Längsfurchen wie bei *dorsalis* F., jene fein lederig genarbt. Gleichmässig quergewölbt, vorne allmählich in die Längswölbung des Kopfes übergehend, hinten flach an das Schildchen anschliessend.

Schildchen am Ende gleichmässig gerundet, beim ♂ etwas spitzer, aber keine Zunge bildend, zweimal so lang wie die Pronotummittellinie, vorne so breit wie die Entfernung der Pronotumvorderecken voneinander, mit seiner hinteren Hälfte den Hinterleib vollständig überdeckend und dort so breit wie das Pronotum hinten, seitlich gesehen ganz flach bis kurz nach seiner Mitte sehr wenig ansteigend und dann in einem sehr flachen Bogen abfallend; querüber gleichmässig gewölbt. Durch Häufung der weiss inkrustierten Wirrhaare können eine feine, auf dem Pronotum bis zum Nacken sich fortsetzende Mittellinie und je 1 weisser Fleck zwischen Mittellinie und Grundwinkel des Schildchens entstehen.

Connexivum ebenfalls mit je 1 Büschelchen weisslicher Haare an den Hinterecken der Segmente.



Odontoscelis tomentosus Germ.

Fig. 1: ♂, Penisscheide von der Seite. — Fig. 2: ♂, Penisscheide von unten. — Fig. 3: Genitalgriffel. — Fig. 4: ♀, Genitalsegmente.

Schenkel und *Schienbeine* schwarz, kurz braun behaart, mit einzelnen langen hellbraunen Borsten. Schienbeine auf der Aussenseite mit kurzen, kräftigen braunen Dornen. Tarsen hellbräunlich, letztes Fussglied länger als die zwei ersten zusammen. Klauen braun.

Länge: ♂ 4 mm., ♀ 4 1/4-4 3/4 mm.

Breite: ♂ 2 1/2 mm., ♀ 2 3/4-fast 3 mm.

Die Genitalarmatur der *Odontoscelis*-Arten ist ausserordentlich charakteristisch und ähnelt der von *Eurygaster* (s. Ribaut, Caractères distinctifs de *Eurygaster maura* (L.) et *E. meridionalis* (Peneau), Bull. Soc. d'Hist. Nat. Toulouse LIV, 1926, pp. 103-121).

♂: Die Penisscheide mit 3 Paaren schwarzbrauner Chitinhaken ausgerüstet, von denen 2 auf der Rücken= und 1 Paar auf der Bauchseite befestigt sind. Das oberste Paar umfasst das 2. Paar und ist an der Spitze verschränkt. Diesen beiden Paaren steht das aus kürzeren und schwächeren Hörnern gebildete 3. Paar gegenüber. (S. Fig. 1 und 2). Beide Griffel gleich ausgebildet; vorderer Teil des kräftigen Stils sichelförmig gekrümmt; an der Ansatzstelle der Sichel ragt eine auffällige Borste gegen die Sichelspitze. (S. Fig. 3).

♀: Der bogenförmige Ausschnitt des letzten Bauchsegmentes fast so hoch wie breit; jede der an dieses Segment anstossenden Genitalplatten ist länger als breit, hinten sehr flachbogig gerundet; die dahinter liegenden Genitalplatten ebenfalls, aber viel stärker gerundet. (S. Fig. 4).

Odontoscelis tomentosus Germ. kann mit *Irochrotus montandoni* Schout. verwechselt werden, der ebenfalls bei Cairo vorkommt (Dachor, 27.1.33, leg. Schatzmayr-Koch). Dieser zeigt aber auf dem Pronotum eine bei seitlicher Betrachtung deutlich erkennbare Einsattelung, ist länger wollig behaart und ist etwas grösser; *Odontoscelis hispidula* Jak. ist durch die über die Augen nach vorne hinausragenden Pronotumvorderwinkel genügend unterschieden; den Arten *fuliginosa* L. und *dorsalis* F. (= *minuta* Jak., nach Kiritshenko, Rev. Russe d'Entom. XIII, 1913, No. 3-4) fehlt der wirre Haarfilz und *vittata* Horv. ist grösser und breiter, die Vorderwinkel des Pronotums sind bis zur Hälfte der Augen vorgezogen und ausserdem zeigt das Schildchen 6 ± lange weisse Haarfilzlängsstreifen.

A contribution to the knowledge of the Palpicornia of Palestine

(with Text-Figures 1-5)

by J. Balfour-Browne, B.A.

This numerically very small collection, largely taken in 1935 by R. W. Washbourn, contains some interesting species. As many of these forms are not included in the list given by Bodenheimer (1) in his recent paper the presentation of so incomplete a fauna list must be excused. Only nineteen species of this large family are here included and no Palestinian Hydraenidae are present in the collection. There can be no doubt that failure to adapt the methods of collection suitable for these small forms accounts for the paucity of records. In addition to the three species recorded by Bodenheimer only one other Palestinian record is known to me, *Ochthebius* (s.str.) *latiusculus* J. Sahlberg (2) from Jericho. I have also recently seen a single female specimen of *Ochthebius* (*Asiobates*) *striatus* Castelnau (3) (which has previously been recorded from Syria), from Jerusalem from Bodenheimer's collection. It is hoped that by drawing attention to the paucity of records of this very interesting family that future collectors may be encouraged to fill the gaps. Of the nineteen species recorded in the body of this paper three are new to science, two being only known from Palestine, the third also occurring in Northern India.

Bodenheimer (l.c.) gives some discussion on the zoogeography of Palestine and the neighbouring areas. In his view the greater part of Palestine belongs to the east Mediterranean or Balkano-Syrian area with the south of Palestine belonging to an area he calls "Saharo-Sindienne". This latter area is chiefly desert and covers the greater part of the Sahara, Egypt, Northern Arabia, Southern Palestine and Persia with Baluchistan and Scind. The incompleteness of the lists of the aquatic coleoptera of Palestine presented herein, while demonstrating the predominance of the Balkano-Syrian fauna gives little information for the formation of an opinion on the relationship of the area to the Ethiopian Region and to Northern India. The elements from these areas must be presumed to have been present before the onset of serious desert conditions to the south and west which are regarded

(1) Bodenheimer, Mém. Inst. Egypte, XXXIII, 1937, pp. 114-115.
(2) d'Orchymont, Soc. Sc. Fennica, Comment. Biol., V (1), 1935, p. 7.
(3) d'Orchymont, Bull. Ann. Soc. Ent. Belg., LXXVII, 1937, p. 221-224.

as of relatively recent geologic age. The climate of southern Arabia is believed to have been considerably more humid at the time of the capture of Arabia Felix by the Romans in 24 B.C. and the onset of severe conditions is believed to have been slow. It must be presumed that the aquatic environment in Southern Palestine is not materially different from that in which the Ethiopian and Oriental forms exist and that in consequence no evolutionary trend to separate the forms has yet appeared. Too much must not, however, be presumed from so small a proportion of the probable Palpicornian fauna.

I have taken this opportunity to include a few records of the Palpicornia from Asia Minor, the fauna of which appears to be equally little known. This area includes the only species of Hydraenidae recorded in the present paper. D'Orchymont [4] has made large collections in this area but his results are not yet published.

— Ochthebius (s.str.) viridis Peyron.

Asia Minor, Burnova, near Smyrna, 27.VII.1931, B. P. Uvarov coll. A single specimen. There is also a specimen in the Champion collection from Besika Bay.

1. Helophorus (s.str.) granularis (Linnaeus).

Pegamia, 30.IV.1931, A. Grünber coll.

2. Coelostoma orbiculare syriacum d'Orchymont.

Jahule, 13.X.1935 (♂♀); Mellaha, 4.XI.1935 (♂).

This subspecies was described [5] on a series of 3 ♂♂ and 3 ♀♀ from Aleppo and 4 ♂♂ from Beirut, both localities in Syria. All the males in Washbourn's series have been dissected and the aedeagus agrees with d'Orchymont's figure. All the specimens in this series have the apical segment of the maxillary palpi a shade darker than the penultimate and antepenultimate segments; the apex of the elytra in all the specimens is more or less reddish-testaceous.

3. Cercyon (s.str.) haemorrhoidalis (Fabricius).

Jerusalem, 26.III.1931, Ph. Jolles; "Coastal zone, Palestine", 20.III.1927.

4. Cercyon (s.str.) quisquilius (Linnaeus).

Jerusalem, 10.IX.1930, G. Japukli.

5. Paracymus scutellaris Rosenhauer (nigroaeneus J. Sahlb.).

Mellaha, 18.IX.1935.

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[4] d'Orchymont, Livre Centen. Soc. Ent. France, 1932, pp. 393-401.
[5] d'Orchymont, Mém. Mus. Roy. d'Hist. nat. Belg., 2 (VII), 1936, p. 9.

6. Laccobius (s.str.) syriacus Guillebeau (Fig. 1).

Yesud Hamalla, 22.IX.1935, (♂♀).

One specimen of each sex which I take to be this species, differing in being slightly larger (3.0 mm. against 2 3/4 mm.) and in having the mentum in the male finely but distinctly reticulated (shining in the female). The

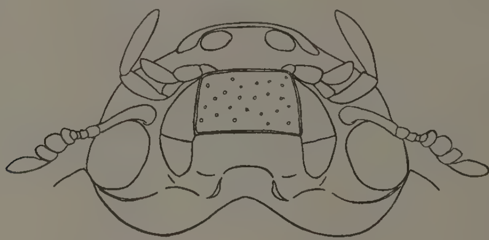

Fig. 1. — *Laccobius syriacus* Guilleb.: Under-surface of head of male to shew the labral specula.

parameres are not longer than the central lobe of the aedeagus and are not at all bent dorsally towards the apex [6]. The specula of the male, which measure 0.05 mm. long (in the antero-posterior axis of the insect) by 0.075 mm. wide, are very small and oval. The front margin of the labrum is straight.

7. Laccobius (s.str.) knischi nov. spec. (Fig. 2).

(*L. nigriceps* Thoms. ab. *maculiceps* Knisch nec Rottenberg).

Holotype ♂, Allotype ♀, Khaula, 4.500 f., Almora, North India (coll. H. G. Champion), Paratypes (♂♀) Ranikhet, Kumaon; West Almora, Kumaon; Hardwar, River Ganges, 2.000 ft., India.

Mellaha, 18.IX.1935 (♀).

The single female in Washbourn's collection agrees closely with a series from Northern India (H. G. Champion), identified by Knisch as *nigriceps* Th. ab. *maculiceps* Rott. in the British Museum collection. Rottenberg [7] makes *maculiceps* differ from *nigriceps* only in the possession of yellow patches in front of the eyes. He says of *nigriceps* "Der Kopf.... der ganz grund zwischen der Punktirung sehr fein, gleichmassig chagriniert". The *maculiceps* of Knisch has the interstices of the punctuation shining, with, at most, an almost completely effaced reticulation. A further distinction between the two forms is to be seen in the punctuation of the mentum which, in *maculiceps*, is close together so that the interstices

(6) d'Orchymont, Soc. Ent. France, Livre Centen., 1932, p. 398.
(7) Rottenberg, Berl. Ent. Zeitschr., 1864, VIII, p. 308, 310.

appear rugose, whereas in *knischi* the punctures are few and the interstices flat and shining, with an effaced reticulation visible only in some lights.

The specula of the male labrum in *maculiceps* are small and rounded, barely wider than long (measurements 0.09 mm. long, 0.11 mm. wide). In *knischi* they are larger and evidently transverse, each occupying a little less

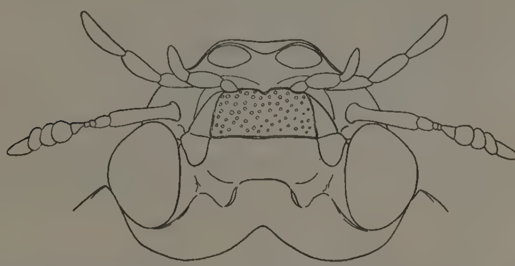

Fig. 2. — *Laccobius knischi* nov. spec.: Under-surface of head of male to shew the labral specula.

than one third of the width of the labrum (measurements 0.10 mm. long, 0.14 mm. wide), the anterior margin of which is sinuate.

The antennal club is normally infuscate in *maculiceps* and pure yellow in *knischi*.

The aedeagus sharply distinguishes the two forms. In *maculiceps* the central lobe is narrower, the parameres are broader at the base, then narrowing abruptly and the apices, which are pointed, are sharply curved upwards (the aedeagus of *nigriceps* Thoms. is quite similar); the parameres of *knischi* appear less strongly chitinised, the apices are spatulate and barely deflected upwards.

The species belongs to the division of the genus without the patch of scattered setigerous punctures at the base of the intermediate femora. The size ranges from 4.19×2.46 to 3.40×1.96 mm.

8. Laccobius (s.str.) levantinus nov. spec. (Figs 3 and 4).

Holotype ♂, allotype ♀, Lake Huleh, 1935; Paratype ♂ and ♀, Mellaha, 21.IX.1935; Paratype ♀, Jahule, 13.X.1935.

Ovatus, convexus, minime parallellus, nitidus; capite nigro, utrinque ante oculos plaga flava, crebre subtiliter punctato, tenuissime, sed conspicue, reticulato, postice obsoletiore; pronoto nigro, utrinque margine flavo, postice latiore, subtiliter irregulariter punctato, pertenuissime vix visibiliter reticulato; scutello nigro, punctulato; elytris ovalis, pallide flavis, seriebus plus minus regularibus punctorum nigrorum, seriebus internis, (praecipue feminae) sulciformis, inter series punctorum punctis nigris irregularibus adspersis, ad mar-

gines minus distinctis. Subtus niger, mento crebre sed nonnulla ruguloso, punctato, obsoletiore vix visibiliter reticulato; antennis palpisque flavis, his cum clava infuscata; pedibus rufo-flavis.

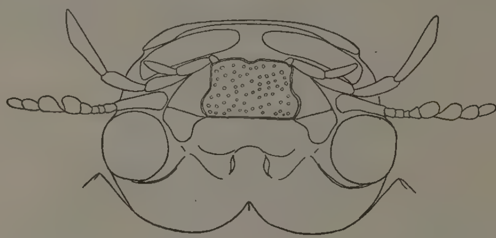

Fig. 3. — *Laccobius levantinus* nov. spec.: Under-surface of head of male to shew the labral specula.

This species appears to be related to *sulcatulus* Reitter (8) from Luristan, Persia. It is rather smaller than that species (♂ holotype 3.8 × 2.0 mm., ♀ allotype 3.3 × 2.0 mm., the paratypes within these size limits); the three

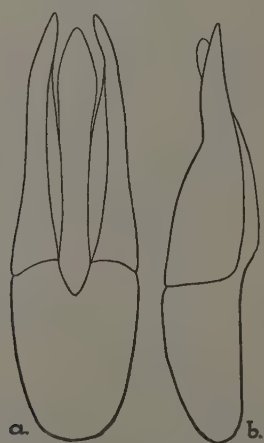

Fig. 4. — *Laccobius levantinus* nov. spec.: Aedeagus, dorsal view (a), lateral view (b).

inner inter-sulci are quite flat, not at all convex. It also differs from *sulcatulus*, as that species is interpreted by d'Orchymont (9), by the form of the

(8) Reitter, Ent. Blätter, Jahrg. 5, 1909, p. 80.
(9) d'Orchymont, Soc. Ent. France, Livre Centen., 1932, p. 400, fig.

specula of the male labrum. These are much more transverse than in any species known to me, each occupying only slightly less than one-half the width of the labrum, the unoccupied area being about equal to the length (i.e. in the antero-posterior axis of the insect) of the speculum. This extreme transverseness of the specula renders the anterior margin of the labrum quite straight. The measurements of the right labral speculum are : length 0.09 mm., width 0.40 mm. These measurements are identical for both holotype and paratype.

The new species belongs to the group of the genus characterised by the presence of a patch of scattered setigerous punctures at the base of the intermediate femora of the male, but not of the female.

Hydrobius fuscipes (Linnaeus).

Asia Minor, Smyrna Province, Bozdagh Mts., Goelchik, 29.VII.1931, B. P. Uvarov coll.

9. **Helochares (Helocharimorphus) sharpi Kuwert.**

Yesud Hamalla, 18-22.IX.1935 (1 ♂, 2 ♀♀).

10. **Helochares (s.str.) lividus (Förster).**

Yesud Hamalla, 13.VII.1935 ; Mellaha, 11.XII.1935 ; Lake Huleh, 1935.

11. **Helochares (s.str.) longipalpis (Murray).**

Jahule, 13.X.1935 (2 ♂♂) ; Mellaha, 31.X.1935 (4 ♂♂, 2 ♀♀).

This species was described [10] from West Africa but has since been recognised as widely spread throughout the Ethiopian continent. *Filipalpis* Sharp from the White Nile is a synonym of this species. It appears not to have been recognised outside the boundaries of Africa before this.

12. **Enochrus (Lumetus) ater Kuwert.**

El Amanyia, 8.X.1935 (♀) ; Jahule, 13.X.1935 (♂).

13. **Enochrus (Lumetus) maculiapex (Kuwert) (?).**

Near Jerisheh, 4-7 miles E.N. of Jaffa, 29.IV.1918 (♂ ♀), Major E.E. Austen coll.

I am not certain of this identification, all the specimens being immature. One of the males has been dissected ; the aedeagus is very poorly chitinised, but so far as it has been possible to compare it, it is identical with a male which, (with female), is in the British Museum labelled "Merv. Transcasp. 5.90" and "*Philydrus maculiapex* Kuw. Type" in Reitter's handwriting. They were from coll. Hauser. Assuming that the figures on the label indicate May 1890, it is difficult to account for Reitter's use of the word type,

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(11) Kuwert, Deutsche Ent. Zeitschr., XXXII, 1888, p. 284.
(10) Murray, Ann. Mag. Nat. Hist., (3) IV, 1859, p. 123.

since the species was described in 1889 ([11]) and the type locality and only locality mentioned is Egypt. Both specimens answer Kuwert's description, as does a less immature female from the Jerisheh series. The occurrence of the species in Palestine cannot be described as improbable but as it is only known to me by the doubtful Transcaspian specimens I have accompanied the record with a query mark.

14. Sternolophus (s.str.) solieri (Castelnau).

Mellaha, 18.IX.1935 (1 ♀).

15. Neohydrophilus levantinus nov. spec. (Fig. 5).

Mellaha, 8.XII.1935 (Holotype ♂, Allotype ♀).

Elongatus, modice convexus, modice parallellus, niger, nitidus, violaceo-micans; capite densissime pertenuissime punctulato, fronte antice emarginato, seriebus punctorum majorum antero-externo et inter-oculo; thorace densissime pertenuissime punctulato, utrinque ad basin fovea minuta impressa; elytris impunctulatis, perminutissime alutaceis, seriebus punctorum

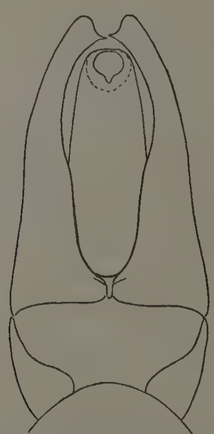

Fig. 5. — *Neohydrophilus levantinus* nov. spec.: Aedeagus, dorsal view, shewing the position of the terminal gonopore.

quatuor, plus minus regularibus impressis. Subtus niger, antennis (clava excepta) et palpis rufo-flavis, pedibus rufo-piceis, illis posticis, praecipue tibiae, magis infuscatis; carina prostitali postice haud spinosa, fere recta, antice rotundata; carina mesostitali parte anteriore perpendiculariter praerupta; carina metastitali postice spina breve; ultimo segmento abdominis area apicali glabra. — Long. 19.0 mm., lat. 9.5 mm.

This new species appears to be quite distinct from all previously des-

cribed by the extremely fine dense punctuation of the head, pronotum and scutellum and by the form of the aedeagus, which is built on a different plan from that normal to the genus. I am, however, unable to find any characters which would justify the erection of a new subgenus for the species. The new species appears most similar to *distinctus* Hope, but may be easily recognised by the character of the punctuation, the form of the prosternum (in which the prosternal carina is more developed, the keel glabrous and the posterior angle a little more acute), and by the form of the aedeagus.

16. Amphiops lasioides Regimbart.

Mellaha, 21-23.IX.1935 (♂ and ♀); El Amanyia, 5.X.1935 (♀).

This species was originally described ([12]) from Madagascar, West Africa (Cape Lopez), and Egypt (Cairo). It is known to me only by specimens from the Sobat River. The Palestinian specimens agree with these in the reddish colour and the aedeagus of a male in each series has been compared.

17. Berosus (Enopleurus) spinosus guttalis Rey.

South Palestine, Deir-El Belah, 8 miles S.W. of Gaza, IV.1917, Major E. E. Austen coll.

[redacted] **Berosus (Enopleurus) spinosus schusteri Kuwert.**

Asia Minor, Burnova, near Smyrna, 26.VII.1931, B. P. Uvarov coll. (♂).

A single male of this species agrees exactly with a male from Mesopotamia (Millingen, Sharp coll.) labelled "*Enopleurus schusteri* Kuw." in Kuwert's handwriting. I think there can be no doubt that this form is as valid a sub-species as is *guttalis*. The form is characterised by being smaller and more elongate than *spinosus* with the sutural angle of the elytra barely dentate (more so in the female), and possessing a small emargination in the posterior border of the fifth sternum in the male. The emargination is more shallow than in *guttalis* and the lateral extremities of the emargination appear shortly dentate but the structure is obscured by the dense hydrofugal pubescence of the venter.

18. Berosus (s.str.) affinis Brullé.

Mellaha, 18.IX., 1.X., 11.XII.1935.

19. Berosus (s.str.) signaticollis ssp. dispar Reiche and Saulcy.

Mellaha, 8.XII.1935 (♀).

A single female which appears to belong to this sub-species as it is interpreted by Ganglbauer ([13]).

([12]) Regimbart, Ann. Soc. Ent. France, LXXII, 1903, p. 44.
([13]) Ganglbauer, Käfer Mitteleur., IV, pt. 1, 1904, p. 225.

Séance du 16 Mars 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

Description of a new species of *Leptomastix* parasitic in *Phenacoccus hirsutus* Green

by HAROLD COMPERE, Assistant Entomogist,
Citrus Experiment Station and
Graduate School of Subtropical Horticulture,
University of California, Riverside, California, U.S.A.

E.M.N.

Leptomastix phenacocci spec. nov.

A yellow and black species with hyaline wings, black middle coxae, and black mandibles with brown teeth which conspicuously contrast to the cream or yellow color of adjacent parts. In these characters it is similar to *L. nigrocoxalis* Comp., a species reared from a grass inhabiting mealybug collected in Natal, South Africa. With few exceptions the description of *L. nigrocoxalis* might apply to this species equally well. When samples of the two species are viewed side by side it is evident that they are quite distinct. The integument of *L. phenacocci* is more deeply pigmented and does not appear semi-transparent and the black coloration is more extensive. On the mesoscutum the blackish color is shaped like a V, the apex towards the axillae and expanding anteriorly. The position of the ocelli is different, and *L. phenacocci* is more robust.

Female: Head lemon yellow to brownish yellow or orange with dusky to black markings as follows: a broad, black blotch across the center of the occiput; frontovertex brownish yellow to lemon yellow with fuscous suffusions extending posteriorly from each lateral ocellus; the gently rounded convexity between the antennae partly suffused with brown and the sockets marked with dark brown above; cheeks and lower portion of face pale lemon yellow with the mandibles black in striking contrast. Antennae black except the basal end of the scape which is tipped with white and the ventral and lateral aspects which are soiled white or yellowish, and the apical half of the pedicel which is suffused yith yellow or brown. Collar of pronotum yellow,

the concealed part black. Mesoscutum extensively black anteriorly and medianly, grading to light brownish yellow on the sides, the lateral margins narrowly blackish; clothed with short dark setae, the integument delicately but visibly sculptured. Axillae light brownish yellow concolorous with the light colored portion of the mesoscutum and furnished with similar setae. Scutellum pale lemon yellow with a slight brownish suffusion in the center contiguous with the anterior margin; strongly elevated with vertical sides, conspicuously outlined on either side by intensely black, carinated, skeletal processes, the color of which extends on the sides of the scutellum as black blotches; the disk furnished with small black setae similar to those on the axillae and mesoscutum and at the apex with a preapical and apical pair of setae of larger size. Metanotum pale lemon yellow, outlined anteriorly by the black skeletal processes. Tegulae yellowish white or cream colored basally, transparent and slightly dusky towards the apices. Propodeum mostly pale yellow grading to dark brown on the sides posterior to the spiracles. Sides and sternum of the thorax yellow to cream color with the propleura blackish towards the coxae and the mesosternum blackish on the lateral anterior parts. Abdomen black to dark brown above grading to brownish yellow on the sides and underparts. Coxae of middle legs black, the remainder of the legs white to pale yellow with faint dusky suffusions on the ventral aspect of the hind femora, dorsal aspect of hind tibae and distal two or three tarsal joints of all legs.

Head in dorsal aspect, measured in one focal plane without regard to curvature, a trifle more than twice as wide as long (32:15) with the frontovertex a trifle longer than wide (15:14). Ocelli in slightly less than a 90° angle, the posterior pair slightly farther apart than to the orbital margins and a trifle closer to the occipital margin than to the orbital margin. The ratios of ocellar measurements are as follows: diameter of a posterior ocellus 4, distance apart 8, distance from the orbits 6, distance from the occiput 5. Head in frontal view slightly wider than high (32:29), the eyes strongly protuberant with the inner orbits almost parallel and reaching downward more than two-thirds way (22:29). The eyes and frontovertex appear glabrous (if delicate setae are present they have been destroyed or made invisible by the solution in which the specimens were preserved). Between the antennal sockets on the lateral sides of the median convexity are short rows of dark setae.

Mesoscutum about two-thirds as wide (19:30). Scutellum slightly wider than long (18:15).

Antennae long and slender; scape about five times as long as wide, as long as the first two funicle joints combined; pedicel twice as long as wide; funicle joints gradually decrease in length, the first a trifle more than three times as long as wide (7:2) and almost twice as long as the sixth (7:4); the

increase in width of the funicle almost imperceptible as the sixth joint is about one and one-fourth times as wide as the first.

Forewings two and one-half times as long as wide, uniformly ciliated; the speculum wide, cut off from the basal hairless area by four rows of cilia.

Length, 2 mm.

Male: In color the males are quite similar to the females except that the coxae of the middle legs are yellowish or sordid white with a faint trace of dusky, the mandibles are not black basally, and the mesoscutum is orange yellow with the concealed anterior part black only.

Described from ten females and five males, holotype, allotype, and paratypes, received from Prof. Dr. H. Priesner, Director of the Entomological Section, Ministry of Agriculture, Cairo, Egypt.

Holotype and allotype to be deposited in the British Museum (Natural History), London, paratypes to be deposited in the British Museum, and in the Entomological Section, Ministry of Agriculture, Cairo.

In regard to this species, Prof. Priesner stated, in a letter from Cairo, Egypt, dated September 27, 1937 : "..... a species of Encyrtid which is very abundant here and parasitizing *Phenacoccus hirsutus* Green, this encyrtid which we originally received from Buitenzorg, Java, ...".

Studies on the Mediterranean Fruit-Fly: *Ceratitis capitata* Wied.

I. THE STRUCTURE AND OPERATION OF THE REPRODUCTIVE ORGANS

(with 5 Plates)

by A.D. Hanna

B.Sc.Hons. (Lond.), A.R.C.S., D.I.C., Ph.D.(Lond.). F.R.E.S.

The present paper is the first of an intended series dealing with the life-history and the control of the Mediterranean fruit-fly (Plate I). It is principally concerned with the structure and operation of the reproductive organs of the fly, a study of which was found to be a necessary preliminary to the study of its control as these organs are directly responsible for the damage it causes to the different fruits of our orchards. A study of the fruits infested by this world wide pest shows that practically every fruit of value to man is subjected to its attack.

A survey of literature reveals that no references appear to have yet been made on the detailed structure and operation of the genitalia in any of the Trypetid flies.

THE FEMALE

The Abdomen. — The abdomen is oviform with the broad end basal. The apparent number of segments which compose the abdomen is nine. The first to the sixth segments do not differ widely from those of other Diptera. The seventh segment however, is more or less conical, the tergum and the sternum are fused and it is slightly pressed dorso-ventrally. Its ventral side is produced anteriorly to form a triangular area (Plate II, Fig. 1 RCT.). The chitin at the front part of this area is very thin and forms an oval membrane (Plate II, Fig. 1 MEM.). This structure gives flexibility to the chitin when the tip of the triangular area is turned upwards and backwards, thus preventing the chitin from snapping off as this part functions as a valve as will be mentioned later (Plate II, Fig. 1 VAV.).

The eighth segment is very long and tubular. Its anterior part is strengthened on both sides by two flexible thin chitinous pillars which thin out posteriorly (Plate II, Fig. 2 CIT). The middle part is ornamented with

conical projections. These are very prominent in the middle area and decrease in size at both the anterior and posterior ends (Plate II, Figs 2 and 3 CON.). The posterior end of this segment carries microscopic projections of the same nature. During repose this segment is invaginated into the seventh segment and during oviposition, it extends out. These conical projection seem to prevent the snapping off of the chitinous walls during the invagination or evagination of this segment, and cause the quick action of protrusion and intrusion.

The ninth segment is adapted for piercing. Its two lateral sides are strengthened by two strong chitinous ribbons which articulate anteriorly with the posterior end of the eight segment. Towards their posterior end they approach each other and fuse to form the tip of the ovipositor (Plate II, Figs 4 and 5 RIB. and TIP.). On the dorsal side of this segment there is a chitinous plate (Plate II, Fig. 5 CTP.) the hinder part of which is broad and is fused with the tip of the ovipositor and thins out anteriorly until it ends a little distance behind the anterior end of that segment. On its ventral aspect there are two chitinous narrow ribbons articulating to the posterior end of the eighth segment and ending free towards the tip of the ovipositor. These chitinous structures are all connected by a membrane so as to form a tube more or less elliptical in cross section. The membrane stretching between the two ventral chitinous ribbons and the two lateral ones is, however, thrown into longitudinal folds which allow for a tube of much wider calibre during the passage of eggs (Plate II, Fig. 6).

The opening of the ovipositor is situated at the free ends of the ventral chitinous ribbons (Plate II, Figs 4 and 6 OPN.).

The Internal Reproductive Organs

The Ovaries. — Each of the two ovaries of a freshly emerged female is bound in a small compact oval mass by a trasparent membrane. When the female is sexually mature, the ovaries extend in the body cavity, almost obliterating it. Each ovary consists of about 28 ovarioles containing eggs in various stages of development. They are rather short and convoluted on themselves at their free ends. The mature eggs (Plate II, Fig. 8) are situated nearest the union of the two oviducts and the eggs that precede these are abruptly small in size (Plate II, Fig. 9 EGG.). The three zones of a typical ovariole are recognisable. The terminal filament is very slender and short and ends freely in the body cavity. The germarium consists of primordial germ cells disposed one behind the other without the intervention of nutritive cells ; it is thus of the "paniostic type". The vitellarium consists of the developing eggs. In the newly emerged females no ripe eggs are present and there is a series of developing eggs increasing gradually in size from the terminal filament to the base of the ovarioles (Plate II, Fig. 7 OVR.).

The Genital Ducts. — The short, thin-walled oviduct (Plate II, Fig. 7 OVD.) unite to form the common oviduct which is wide and comparatively long and ends into a small pouch which is the beginning of the vagina. It is located in the anterior part of the seventh segment. The vaginal duct (Plate II, Fig. 7 VAD.) is very long and during repose, it is reflected once on itself inside the seventh abdominal segment (Plate III, Fig. 11 VAG.) and during oviposition and the distension of the ovipositor it straightens up. It stretches from the seventh segment and runs through the eighth and finally opens at the posterior part of the ninth segment as mentioned before (Plate II, Fig. 7 OPN.).

The Spermathecae. — The spermathecae are the organs adapted for the reception and storage of spermatozoa. They are two in number, one on each side (Plate II, Fig. 7 SPR.). Each is a small black and chitinous oval sac surrounded by two or three layers of cells with yellow pigment. The sac has a very long, slender tube (Plate II, Fig. 7 DSR.) which opens on the dorsal side of the vaginal dilatation.

There is a pair of colleterial glands (Plate II, Fig. 7 CLG.) which are heart-shaped in outline. The posterior end of each is drawn into a fairly wide tube reflected once on itself, and thins out to run into a much narrower and longer tube opening on the dorsal side of the vagina outer to the spermathecal duct (Plate II, Fig. 7 CLD.).

The Operation of the Ovipositor

The protrusion of the ovipositor is brought about by :

(1) The longitudinal and sternal muscles — belonging to the first, second, third, fourth, fifth and sixth abdominal segments — which arise from the tergum or sternum and are inserted into the corresponding region of the segment behind. The sternal muscles (Plate III, Fig. 10 STM.) are prominent and when they contract they curve the abdomen downwards. It is evident that they are so prominent to resist the tension during forcing the ovipositor into the fruits stung. The tergal muscles are not so conspicuous and their contraction causes the abdomen to straighten up and regain its resting position.

(2) The dorso-ventral muscles stretch between the tergum and the sternum of the first to the sixth abdominal segments (Plate III, Fig. 10 DVM.). The contraction of these muscles brings the tergites and the sternites nearer to each other, thereby compressing the blood which in its turn rushes to the seventh abdominal segment.

(3) The two ventral muscles of the abdominal segment (Plate III, Figs 11 and 12 VMS.), each arise from the tip of the triangular area — which is the anterior prolongation of the ventral side of the seventh segment — and

spreads in a fan-like manner, and is finally inserted, one on each side, on the ventral and lateral walls of that segment. The contraction of these muscles causes the valve (Plate III, Fig. 16 VLV.), mentioned above, to curve upwards and backwards thereby closing the opening of the seventh segment, which will be explained later, thus preventing the blood from running back to the preceding part of the abdomen (Plate III, Figs 14 and 15 VLV.) when the dorsal set of muscles come into action.

(4) The dorsal muscle of the seventh segment (Plate III, Figs 11. 12 and 14 DMS.) stretches between the anterior lateral sides of this segment and also between the median dorsal surface to the lateral sides of the latter segment. It forms together with the ventral muscles an opening at the anterior part of the seventh segment through which the vaginal duct passes to the succeeding segments (Plate III, Figs. 11 and 12 OPN.). This muscle serves to approximate the two lateral sides of that segment, thus producing a pressure on the blood therein.

Now, when the longitudinal tergal and sternal muscles together with the dorso-ventral muscles contract, they force some of the blood into the seventh segment, then the two ventral muscles come into action and close the valve, thus preventing the blood from escaping to the anterior part of the abdomen (Plate III, Fig. 14 VLV.). Finally when the dorsal muscle comes into action, it presses the blood contained in the seventh segment and as the opening between the latter segment and the anterior part of the abdomen is closed, the blood confined causes a pressure on the acute angle between the posterior edge of the seventh segment and the anterior base of the eighth (Plate III, Figs 12 and 13 ANG.) and causes the latter to protrude gradually until it is completely extended, hence the ovipositor is ready for action.

The ovipositor can be adjusted to the place chosen to produce a puncture by two sets of muscles.

(1) A band on each side arising from the anterior end of the sixth sternite and inserted at the middle of the triangular area of the seventh segment (Plate III, Figs 10 and 12 MU1).

(2) Another band stretches, one on each side, from the posterior part of the sixth sternite to the anterior lateral sides of the seventh segment (Plate III, Figs 10 and 12 MU2.).

These two sets of muscles are concerned with the movement of the seventh segment to the right or the left.

After oviposition takes place, the muscles of the abdomen relax causing the increase in the size of the abdomen, at the same time the valve of the seventh segment is opened by the contraction of two long muscles which are inserted into the tip of the valve on one hand and the anterior end of a chitinous rod (Plate III, Fig. 10 CTR.) — which is an anterior median elongation of the sixth sternite stretching forward to the fourth sternite —

on the other (Plate III, Fig. 10 MUS.). The pressure of the blood within the seventh segment is released by the opening of the valve and the escape of the blood to the preceding segments together with the relaxation of the dorsal and ventral muscles pertaining to that segment, thereby causing a sort of vacuum inside the abdomen. The atmospheric pressure then comes into play and its action is more pronounced on the softer part of the abdomen, e.g. the eighth segment. This pressure together with the action of the muscles, that will soon be mentioned, causes the invagination of the eighth segment into the seventh (the resting position). These muscles are six in number, three on each side (Plate III, Figs 13 and 15 MUS.). They all start from the anterior edge of the ninth segment and run through the eighth segment. The outer muscle is inserted towards the anterior ventral part of the seventh segment; the middle one to the tip of the valve, and seems to be continuous with the long muscle attached to the tip of the anterior median elongation of the sixth sternite; the inner muscle ends at the middle dorsal surface of the seventh segment.

The vaginal duct is straight during oviposition, the loop that it forms during repose, however, seems to be brought about by the action of two sets of muscles on each of its sides. They start near each other from the posterior part of the seventh segment and one ends at the beginning of the vagina and the other a little behind it (Plate III, Fig. 11 VMS.).

THE MALE

The Abdomen. — The male abdomen is a little smaller than that of the female and consists of eight apparent segments. The first to the fifth segments are similar to those of the female. The sixth segment is different to other segments in being free from hairs (Plate I, male). It is broad on the ventral side and thins out dorsally to form a ring incomplete on the upper side. The seventh segment (Plate I, male) has gone considerable modification in the formation of the external genitalia and is in the form of an incomplete ring on the ventral side. It is broad dorsally and becomes gradually narrower towards its two lower ends which are produced ventrally to form the claspers (Plate IV, Fig. 20 CLS.). A little distance above the claspers there are two chitinous platforms (Plate IV, Fig. 20 PLT.) each carry a heavily chitinised crescentric tooth which is black in colour.

The eighth segment is a chitinous plate which is almost heart-shaped in outline. Its apex, which is directed forwards is produced into a long stalk articulated to the posterior part of the endoskeleton of the penis which will be mentioned later. This plate is convex on its dorsal side and supports the lower surface of the end of the rectum.

The Internal Reproductive Organs

The Testes. — The testes are a pair of pear-shaped follicles (Plate IV, Fig. 21 TES.), with their long axis placed longitudinally in the body cavity. They are recognisable by the yellow coloured pigment contained in the cells of their outer walls. Microscopically, the interior of the testis is divided into irregular follicles surrounded by a very thin epithelial coat. At the anterior end of the testis, these follicles are full of premetomorphic cells. Towards its hinder end, however, these cells are metamorphosed into sperms.

The Vasa Deferentia and the Accessory Glands. — The pointed end of each testis is directed backwards and is produced into a very long tube (Plate IV, Fig. 21 VSD.) — the vas deferens — which after leaving the testis, is directed forwards for a short distance parallel to the inner side of the testis and then it turns and proceeds backwards to run into a pyriform dilatation which is the vesicula seminalis (Plate IV, Fig. 21 VSS.).

The accessory glands (Plate IV, Fig. 21 ACG.) are four pairs of tubular structures much convoluted on themselves. One pair is very short and runs into the vesicula seminalis towards its posterior end, the second pair is very long and opens into the vesicula seminalis anterior to the first pair, just behind the vasa deferentia. The other two pairs are comparatively short and enter the vesicula seminalis at its anterior part inner to the vasa deferentia. The fourth pair is also short and joins the vesicula seminalis at its anterior median surface.

The Vasa Efferentia. — The vasa efferentia is a long and narrow tube leading out from the posterior end of the vesicula seminalis and running into the reservoir of the "erecting and pumping organ" (Plate IV, Fig. 21 VSE.).

The Erecting and Pumping Organ. — This organ consists of a long chitinous plate broad on one end and narrow on the other. There is a chitinous pillar (Plate IV, Fig. 22 PIL.) fused with the body of the plate and starts from its middle and runs towards the narrow end, along the median line, where it expands to form a round disc (Plate IV, Fig. 22 DIS.) which has two oval gaps which seem to be covered by a membrane (Plate IV, Fig. 22 OPN.). This round disc carries a thin chitinous dome-like reservoir (Plate IV, Figs 22 and 23 RSV.) which receives the vasa efferentia at its anterior surface near the chitinous disc (Plate IV, Fig. 22 VSE.). The ductus ejaculatorius is a comparatively short tube which comes out from the top of the above mentioned dome and runs backwards for a short distance and finally leads into, and runs through the aedeagus (Plate IV, Figs 21 and 22 DEJ.).

A lot of muscles spring from the reservoir near its base and spread over the chitinous plate in a fan-like manner (Plate IV, Fig. 23 MUS.).

A similar organ was found by Lowne (1890-1895) in *Calliphora erythrocephala* which he called "ejaculatory sac". In *Phlebotomus*, its place appears to be taken by an organ termed by Grassi (1907) "pompetta"; but appropriate to its function in the Mediterranean fruit-fly, the present writer suggests calling it the "erecting and pumping organ".

The Aedeagus. — The aedeagus is the terminal part of the ejaculatory duct (Plate IV, Fig. 21 AED.). It is a very long, slender, and tubular structure which comes out from the ventral surface of the abdomen just anterior to the claspers of the seventh segment. During copulation it stretches anteriorly almost the whole length of the abdomen (Plate IV, Fig. 17 AED.) and after this operation is performed, it turns upwards on the right side of the body and coils on the dorsal side of the abdomen above the intersegmental membrane between the sixth and the seventh segment.

It is convenient to divide it into two sections:

(1) The body of the aedeagus (Plate IV, Fig. 18 BOD.) consists of:

(a) An outer tube, the anterior part of which is very thin and membranous (Plate IV, Figs 18 and 19 ANT.) and the posterior one is also thin and membranous but is strengthened by two thick chitinous ribbons running parallel to each other almost the whole length of the body of the aedeagus (Plate IV, Fig. 19 RIB.).

(b) The inner tube is very delicate and is the continuation of the ejaculatory duct. It ends at the tip of the aedeagus as will be mentioned later (Plate IV, Figs 18 and 19 INT.).

Near the base of the aedeagus, there is a big oval gland (Plate V, Fig. 24 GLD.) with large columnar cells. It opens into the outer tube at the base of the aedeagus (Plate V, Fig. 24 BAS.) without the intervention of a neck. The ductus ejaculatorius runs through the base of the gland in its way to the body of the aedeagus (Plate V, Fig. 24 DEJ.).

(2) The head of the aedeagus is a very complicated asymmetrical structure (Plate IV, Fig. 18 TIP.). At its base, the anterior outer wall is produced into a membranous dilatation that could be folded and unfolded in a foot ball bladder-like manner. During repose, it is unfolded, but during copulation it unfolds into an oval bladder (Plate V, Fig. 25 BLD.). Anterior to this bladder, the outer tube of the aedeagus becomes more chitinised to form a cylindrical tube pressed dorso-ventrally and is incomplete on its right side (Plate V, Figs 25 and 26 STB.) which is still membranous. It narrows out towards the tip of the aedeagus where it ends blindly. It might be called the "supporting tube". The ductus ejaculatorius is here heavily chitinised (Plate V, Figs 25 and 26 DEJ.) and at the same time it narrows gradually towards the tip. Before it enters the head of the aedeagus, it bends a little to the left side and then runs parallel to that side of the supporting tube. Towards its end, it turns a little to the right side just underneath the valve

— which will be explained later — until it reaches the toothed bladder situated on the right side where it bifurcates.

The valve consists of two semi-circular sclerites placed vertically (Plate V, Figs 27 and 28 SMS.). One free end of each sclerite is articulated to the upper anterior edge of the supporting tube and the other to the lower one in such a manner as to form with each other a very sharp angle (Plate V, Fig. 26 VLV.). There is a thin chitinous plate stretching between the two arms of each sclerite (Plate V, Figs 27 and 28 CTP.). The free basal part of this plate is fused with its fellow on the other side to form a sort of an arch embracing the ductus ejaculatorius just before it bifurcates (Plate V, Fig. 26 DEJ.).

The outer edge of the right sclerite is produced to form a very large oval sac, the anterior inner side of which is stretched a little forwards forming a conical outgrowth (Plate V, Fig. TBL.). Most of its surface is covered with finger-like outgrowths. Under the microscope these outgrowths gradually disappear if mounted on a slide and the cover slip is pressed. It is free from these projections towards its inner side.

The left sclerite is also attached to a collapsable bladder which might be called "relieving bladder" (Palte V, Fig. 26 RFS.). It is more or less spherical towards the inner side, and its outer sides are produced outwardly to be attached to the two edges of a groove on a long sclerite — the genital rod (Plate V, Fig. 26 GRT.) — articulated to the ductus ejaculatorius some distance behind the valve and proceeds outwards and upwards and becomes grooved towards its end (Plate V, Fig. 26 GRV.). Its tip carries a delicate membranous disc in the middle of which the genital pore is located (Plate V, Fig. 26 GPR.). This genital rod is kept in position by a triangular chitinous plate. It stretches from the posterior half of that rod to the left side of the supporting tube as shown in Plate V, Fig. 26 RCP.

The Operation of the Aedeagus

We mentioned before that most of the aedeagus lies coiled on the dorsal side of the abdomen; when copulation is about to take place, it uncoils and becomes gradually rigid, then it is introduced into the genital pore of the female and pushed into the vaginal duct as far as the anterior part of the eighth abdominal segment. But how does this erection take place?

Now, it seems that after the seminal fluid is collected in the reservoir of the "pumping and erecting organ", the muscles of the latter contract and the size of its reservoir is then reduced and at the same time, the two sides of the vasa efferentia (where it joins the reservoir) are brought into contact, thereby, closing its entrance to the reservoir and preventing the seminal fluid from going up into the vasa efferentia. In this case the only outlet of the fluid will be through the ductus ejaculatorius (Plate IV, Figs 21 and

23 DEJ.) which eventually runs through the middle of the aedeagus and finally opens into the toothed bladder which exerts a pressure over the fluid. The part of the ductus ejaculatorius running in the body of the aedeagus becomes gradually distended, because until then, there is practically no outlet of the fluid at its two openings in the toothed bladder. At this point erection takes place. After this, the pressure on the fluid is gradually increased by the erecting and pumping organ until its pressure in the toothed bladder reaches a certain point where it pushes the plate of the valve forwards causing the two chitinous semi-circular sclerite of the valve to spring apart (Plate V, Fig. 28 SMS.) and the angle between them is increased, therefore the thin chitinous plate is raised and is no more in contact with the ductus ejaculatorius. The two bladders are then in connection with each other and because the toothed bladder exerts a pressure on its contents, the seminal fluid rushes to the other bladder which fills it. Then it becomes unfolded and as this bladder tends always to fold, it expells the fluid into the groove of the genital rod and finally it passes outward through the genital pore. Directly after the passage of the seminal fluid from the toothed to the relieving bladder, the plate of the valve recedes to its original position, closing the opening between the two bladders.

After copulation, the aedeagus is withdrawn from the vaginal duct, the muscles of the pumping and erecting organ relax, so the pressure on the ductus ejaculatorius is released, and as the anterior side of the body of the aedeagus is membranous, while the posterior one is strengthened by two chitinous ribbons, it tends to coil towards the anterior side.

It seems that the space between the inner and the outer tube of the body of the aedeagus is full of a fluid which is produced by the gland at the base of the aedeagus. During erection, when the inner tube is distended, the space between the inner and the outer tube is decreased, so the fluid runs to the bladder at the base of the head of the aedeagus (Plate V, Fig. 25 BLD.) causing its distention. After copulation the fluid recedes and the bladder folds up again.

The Endoskeleton of the Aedeagus

Just anterior to the claspers of the seventh abdominal segment there is an internal chitinised framework on the ventral side of the abdomen which supports the aedeagus and serves for the attachment of the muscles that move the aedeagus in all directions to adjust it to the genital pore of the female.

It is composed of :

(1) A circular sclerite (Plate IV, Fig. 20 CRS.) extending on the internal ventral side of the seventh segment to the posterior part of the sixth. Its

hinder part is articulated to the anterior part of the chitinous platform of the seventh segment.

(2) The body of the skeleton (Plate IV, Fig. 20 BOS.) is a broad plate lying just behind the anterior surface of the circular sclerite. Its front part is produced forwards to form the anterior arm (Plate IV, Fig. 20 ATR.) which passes underneath the circular sclerite. Each of its two lateral sides is produced into a long arm which tends to bend a little downwards to articulate at its free end to the postero-lateral arm (Plate IV, Fig. 20 PLR.) which curves a little upwards and then downwards to rest posteriorly on the circular sclerite. .

The posterior arm (Plate IV, Fig. 20 PSR.) arise from the hinder part of the body of the skeleton, passes a little backwards to articulate a ring-like chitinous process — the base of the aedeagus (Plate IV, Fig. 20 BAS.).

This endoskeleton affords a basis for the articulation of many muscles :

(a) A band of muscles stretches from the lateral arm on each side to the anterior part of the semi-circular sclerite (Plate IV, Fig. 20 MUS1.). The function of this muscle is to pull the base of the aedeagus forwards.

(2) Two bundles of muscles take their origin from the tip of the anterior arm, one on each side, and are inserted into the postero-lateral arm (Plate IV, Fig. 20 MUS2.).

(3) A pair of muscles originating from the articulation of the lateral and the postero-lateral arms and becoming inserted into the base of the aedeagus (Plate IV, Fig. 20 MUS3.). These muscles seem to move the aedeagus to the right and left side.

(4) A single band of muscles pass horizontally between the lateral sides of the semi-circular sclerite (Plate IV, Fig. 20 MUS4.). It serves to draw the two sides of the sclerite nearer to each other.

It seems that the combined action of the muscles 2 and 4 pulls the base of the aedeagus up and down.

Acknowledgement

I wish to express my indebtedness to Prof. Dr. H. Priesner for his continuous help and advice throughout the course of this work.

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PLATES I-V

Explanation of Plate I.

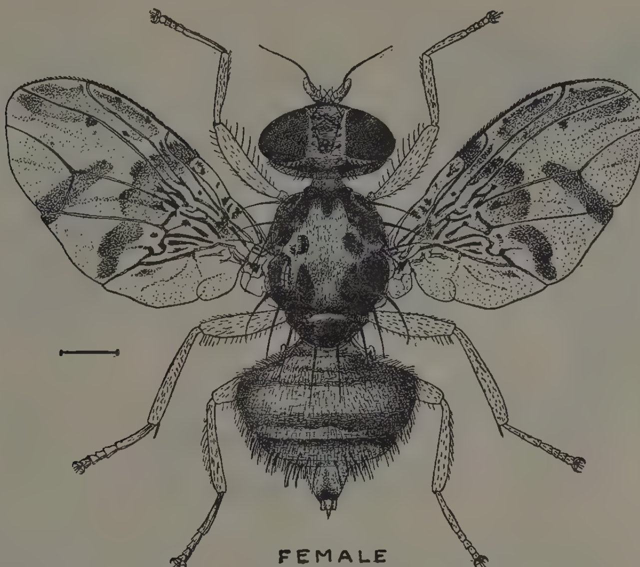
The Mediterranean Fruit-Fly:

Ceratitis capitata Wied.

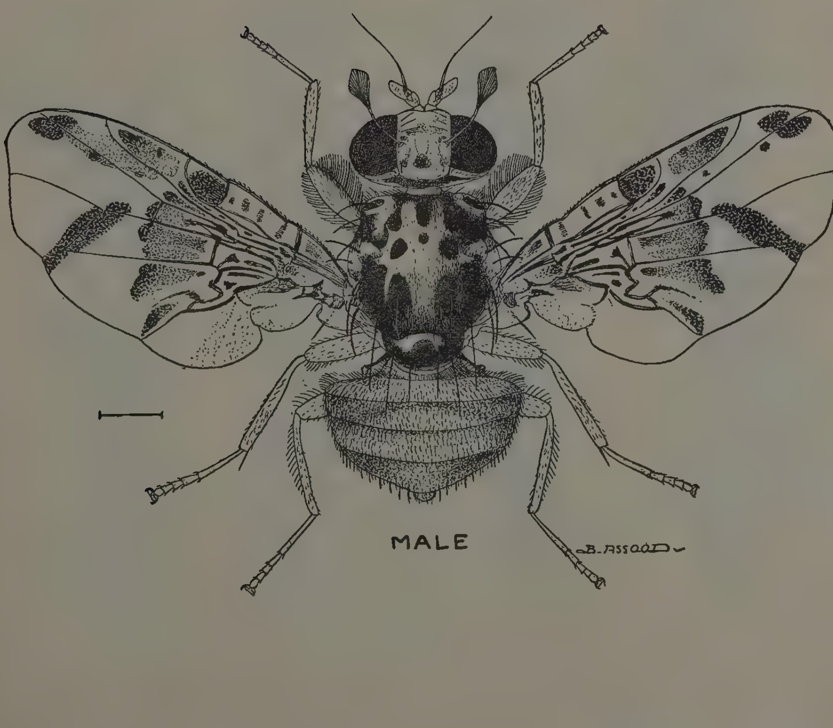
(much enlarged)

A.D. Hanna

Plate I



FEMALE



MALE

Explanation of Plate II

Fig. 1. — The seventh segment, $\times 37\frac{1}{2}$: MEM. = membrane ; RCT. = triangular area ; VAV. = valve.

Fig. 2. — The eighth segment, $\times 50$: CIT. = chitinous pillars ; CON. = conical projection.

Fig. 3. — CON. = conical projections.

Figs 4 and 5. — The ninth segment, $\times 50$: CTP. = chitinous plate ; OPN. = opening of genital duct ; RIB. = chitinous ribbons ; TIP. = tip of ovipositor.

Fig. 6. — The ninth segment, $\times 55$: OPN. = opening of genital duct.

Fig. 7. — The female reproductive organs, $\times 15$: CLD. = duct of colleterial gland ; CLG. = colleterial gland ; DSR. = duct of spermatheca ; OPN. = opening of genital duct ; OVD. = oviduct ; OVR. = ovary ; SPR. = spermatheca ; VAD. = vaginal duct ; VAG. = vagina.

Fig. 8. — Mature egg, $\times 60$.

Fig. 9. — Ovary, $\times 12.5$: EGG. = egg.

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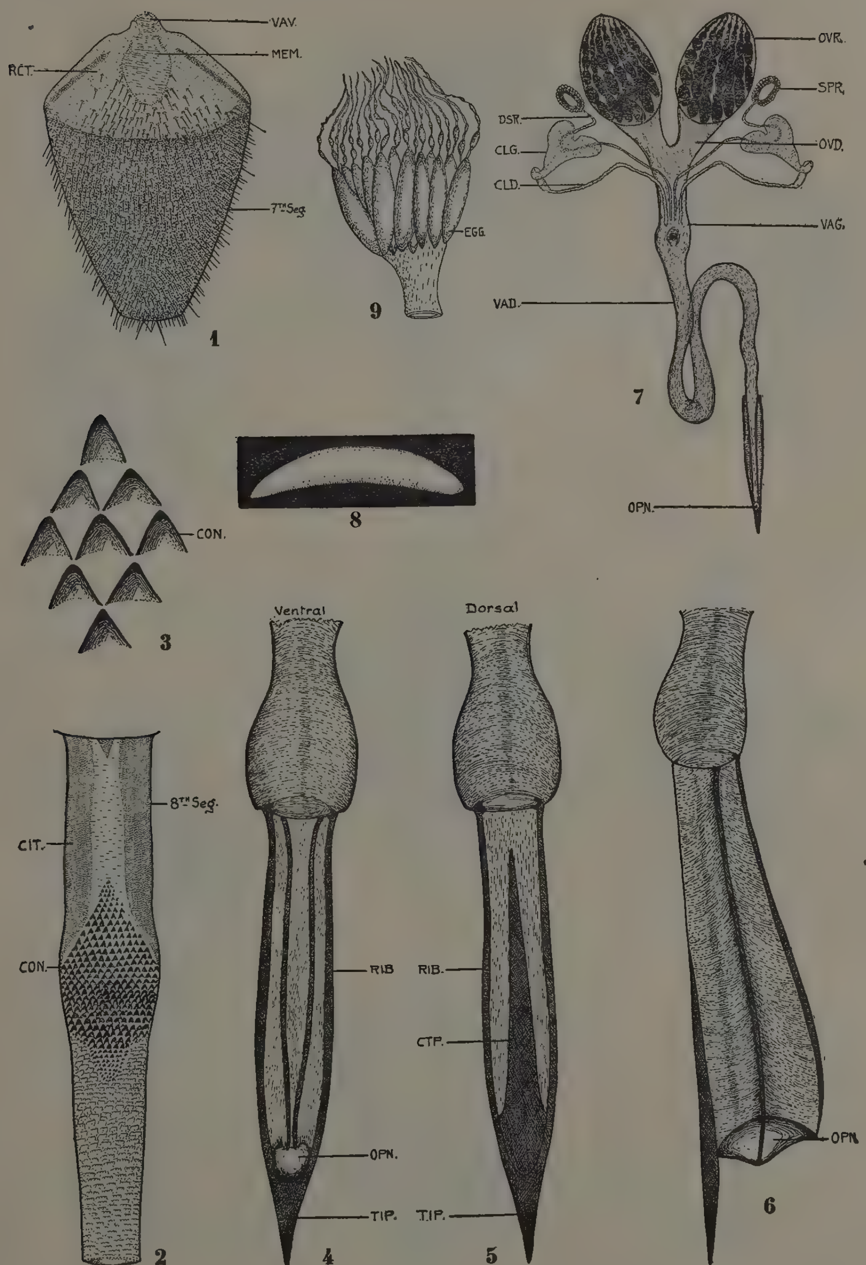
Plate 11



Explanation of Plate III

Fig. 10. — The female abdomen, ×25: CTR. = chitinous rod; DVM. = dorso-ventral muscles; MUS., MU1. and MU2. = muscles; STM. = sternal muscles.

Fig. 11. — The seventh segment, ×40: ANG. = angle between the seventh and the eighth segment; DMS. = dorsal muscle; OPN. = opening; OVD. = oviduct; VAG. = vagina; VGS. = vaginal muscles; VMS. = ventral muscles.

Figs. 12 and 13. — The seventh segment, ×40: ANG. = angle between the seventh and the eighth segment; DMS. = dorsal muscles; MU1. and MU2. = muscles; OPN. = opening; OVS. = ovipositor; VMS. = ventral muscles.

Fig. 14. — The seventh, eighth and ninth segments (ovipositor not completely opened), ×40: DMS. = dorsal muscles; VLV. = valve; VMS. = ventral muscles.

Fig. 15. — The ovipositor protruding, ×40: MUS. = muscles; VLV. = valve.

Fig. 16. — The seventh segment, ×40: VLV. = valve.

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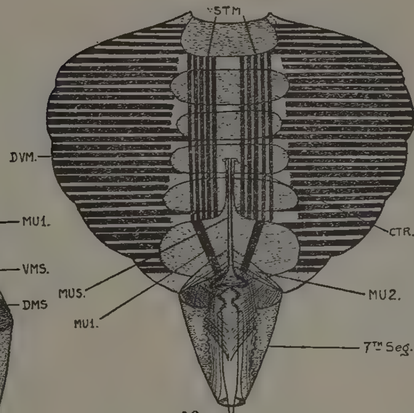
Plate III



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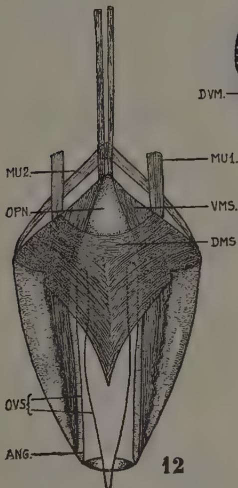

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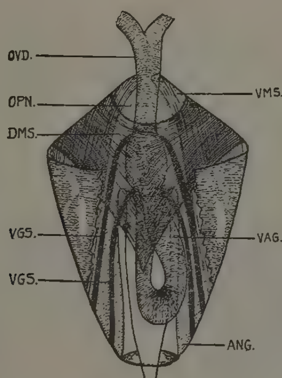

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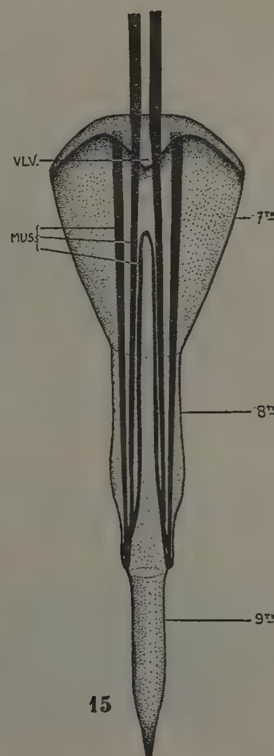

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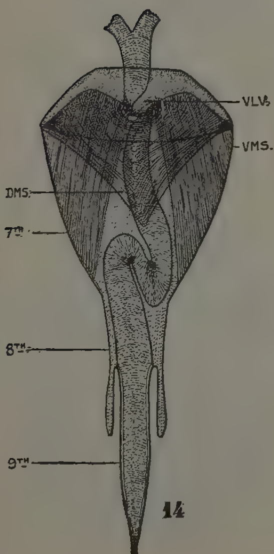

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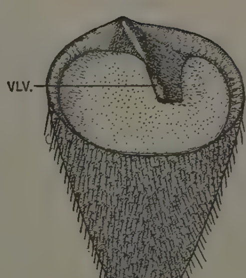

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Explanation of Plate IV

Fig. 17. — The male abdomen, $\times$ 12,5 : AED. = aedeagus.

Fig. 18. — The aedeagus, $\times$ 25 : ANT. = anterior wall; BOD. = body of the aedeagus; INT. = inner tube; PST. = posterior wall; TIP. = tip of aedeagus.

Fig. 19. — A part of the body of the aedeagus, $\times$ 100 : ANT. = anterior wall; RIB. = chitinous ribbons; INT. = inner tube; PST. = posterior tube.

Fig. 20. — The endoskeleton of the aedeagus, $\times$ 85 : ANT. = anterior arm, BAS. = base of the aedeagus; BOS. = body of endoskeleton; CLS. = claspers; CRS. = chitinous ring; LTR. = lateral arms; MUS1., MUS2., MUS3. and MUS4. = muscles; PLR. = postero-lateral arm; PLT. = platform; PSR. = posterior arm.

Fig. 21. — The male reproductive organs, $\times$ 25 : ACG. = accessory glands; AED. = aedeagus; DEJ. = ductus ejaculatorius; EJS. = erecting and pumping organ (ejaculatory sac); GLD. = gland; TES. = testes; VSE. = vasa efferentia; VSS. = vesicula seminalis.

Fig. 22. — The erecting and pumping organ boiled in caustic soda, $\times$ 90 : DEJ. = ductus ejaculatorius; DIS. = disc; OPN. = opening; PIL. = pillar; RSV. = reservoir; VSE. = vasa efferentia.

Fig. 23. — The erecting and pumping organ, $\times$ 90 : DEJ. = ductus ejaculatorius; MUS. = muscles; RSV. = reservoir; VSE. = vasa efferentia.

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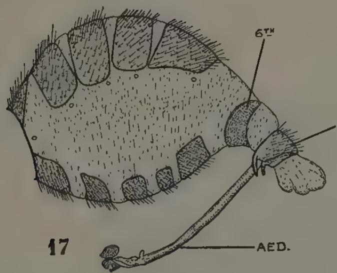
Plate IV



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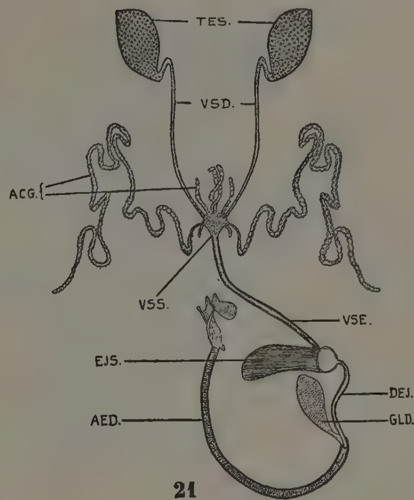

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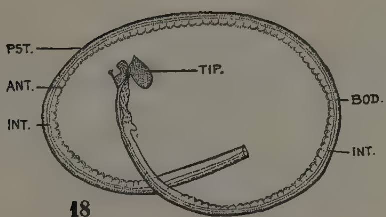

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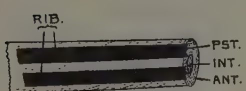

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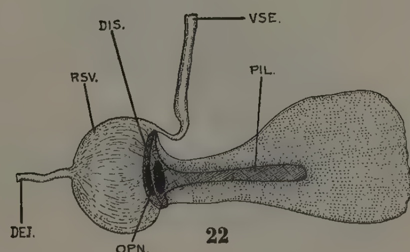

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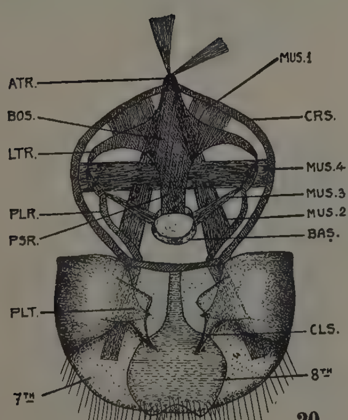

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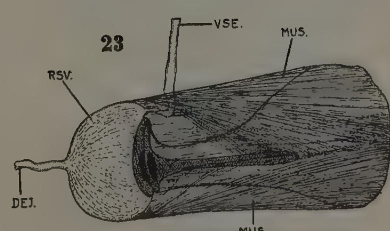

Explanation of Plate V

Fig. 24. — The oval gland with columnar cells near the base of the aedeagus, ×100 : BAS. = base of aedeagus ; GLD. = gland ; DEJ. = ductus ejaculatorius.

Fig. 25. — The head of the aedeagus (ventral aspect), ×150 : BLD. = bladder ; DEJ. = ductus ejaculatorius ; STB. = supporting tube.

Fig. 26. — The tip of the aedeagus, ×350 : DEJ. = ductus ejaculatorius ; GPR. = genital pore ; GRV. = groove ; GTR. = genital rod ; RCP. = triangular plate ; STB. = supporting tube ; TBL. = toothed bladder ; VLV. = valve.

Fig. 27. — The valve closed, ×800 : CTP. = chitinous plate ; DEJ. = ductus ejaculatorius ; SMS. = semi-circular sclerite ; STB. = supporting tube.

Fig. 28. — The valve opened, ×800 : DEJ. = ductus ejaculatorius ; CTP. = chitinous plate ; SMC. = semi-circular sclerite ; STB. = supporting tube.

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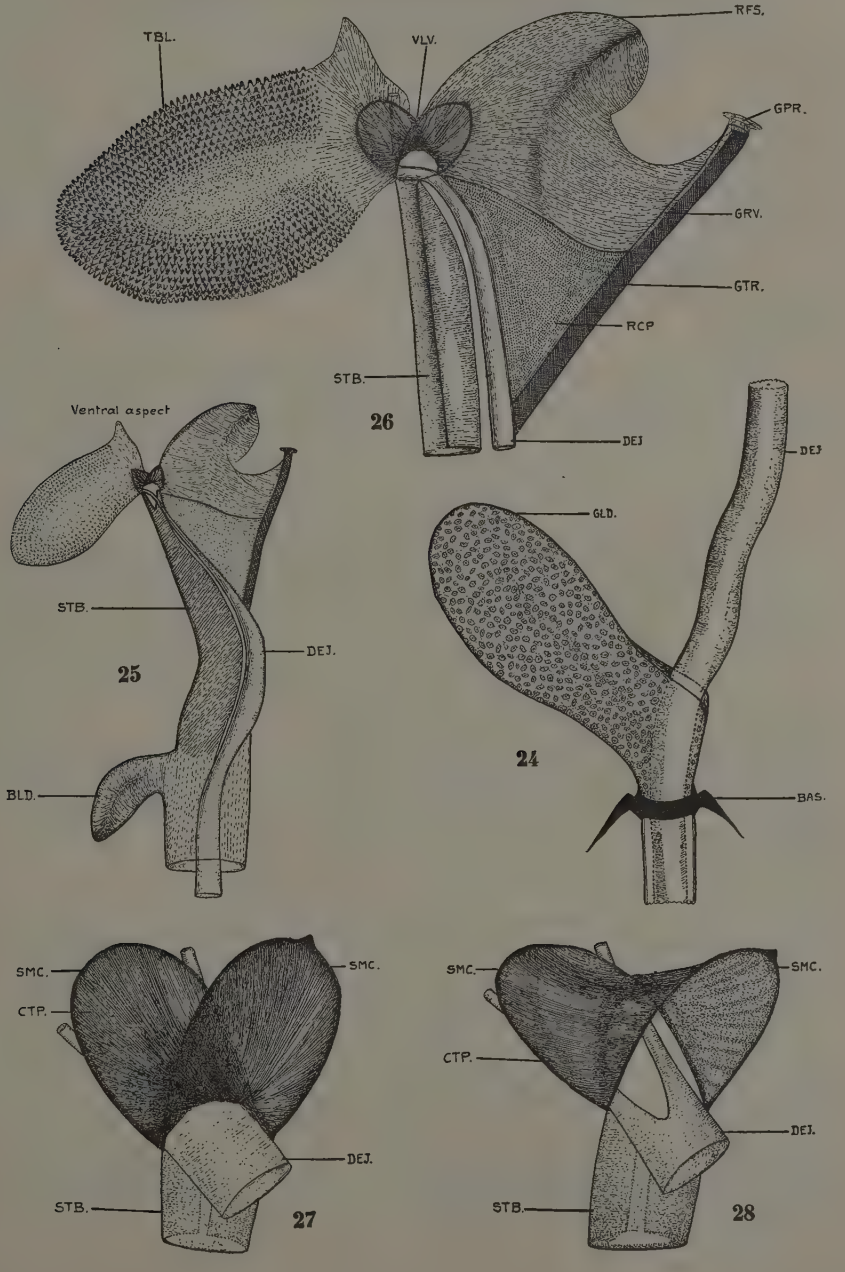
Plate V



Assemblée Générale Ordinaire du 21 Mars 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

Rapport du Secrétaire Général (exercice 1937) :

Messieurs,

Nous venons de clôturer un exercice durant lequel nous avons déployé de grands efforts pour maintenir notre activité au niveau des années précédentes. Cet état de choses est imputable aux sérieuses difficultés créées par la compression de nos dépenses et l'absence d'un Président.

Dans les diverses branches de nos travaux, l'organisation de nos collections et de notre bibliothèque tient une place prépondérante.

Nos collections entomologiques et ornithologiques ont été partiellement remaniées en considération du progrès réalisé dans le domaine de ces sciences. L'inventaire de notre Bibliothèque est actuellement terminé, accusant dans les registres le chiffre de 10.664 ouvrages, périodiques ou brochures.

Il y a lieu de mentionner l'accroissement de l'intérêt porté par la jeunesse à l'entomologie. Des déterminations et des renseignements ont été abondamment fournis aux étudiants venus nous consulter.

Notre bibliothèque et nos collections constituent également une source de documentation à laquelle les entomologistes du Ministère de l'Agriculture, le corps enseignant et les étudiants de la Faculté des Sciences ont souvent recours.

L'Imperial Chemical Industries, des officiers des forces britanniques en Egypte, de nombreux agriculteurs et des naturalistes amateurs ont également bénéficié des possibilités offertes par notre Société et de nos conseils.

Au mois de Juin, il a été publié le Volume IV, fascicule 3, de nos Mémoires, illustré de 204 figures et de 5 planches en couleurs. Ce Mémoire termine la remarquable « Monographie des Asilides de l'Egypte », du Professeur H.C. Efflatoun Bey, et constitue la seule publication distribuée au cours de l'exercice, notre Bulletin 1937 n'ayant pu paraître par suite du manque de fonds.

Parmi les dons reçus pour la bibliothèque et le musée, signalons particulièrement celui du Docteur W. Junk, de La Haye, constitué par les fascicules 148-156 du Coleopterorum Catalogus.

Le nombre de nos membres reste stationaire, par contre l'affluence des visiteurs est sans cesse croissante. Les délégués aux divers Congrès tenus en Egypte et qui ont visité notre Institution, sont unanimes à reconnaître notre parfaite organisation. Un pareil tribut de la part de personnalités aussi éminentes méritait d'être signalé.

De nombreuses Associations ont utilisé notre Salle de Conférences pour y tenir leurs réunions.

Nous avons reçu le chèque de L.Eg. 500, subvention annuelle du Ministère de l'Agriculture, mais l'état de nos finances reste précaire et nous impose des restrictions préjudiciables au développement de notre Société.

Le contrat de votre conservateur a été renouvelé pour trois ans.

Le bilan des comptes de l'exercice vous sera communiqué tout à l'heure par votre Trésorier.

Aux termes de l'article 13 des statuts, les membres sortants de votre Conseil cette année sont les suivants : Messieurs le Professeur H.C. Efflatoun Bey, Professeur G. Torriani, Docteur Kamel Mansour et A. Alfieri. Ils sont rééligibles.

Vous aurez également à élire deux Censeurs.

Nous terminons ce Rapport en dédiant nos respectueuses pensées à notre Bien-Aimé Souverain, Sa Majesté le Roi Farouk Ier, et Lui exprimons nos sentiments de profonde dévotion et nos vœux les plus fervents.

Signé : A. ALFIERI.

Rapport du Trésorier :

Situation au 31 Décembre 1937

Doit	L.E.	MM.	Avoir	L.E.	MM.
Compte Bâtiment (pour mémoire)	1	000	Compte Réserve Générale	15828	043
» Mobilier. » »	1	000	» Subvention du Gouvernement.............	497	000
» Bibliothèque » »	1	000	» Coupons	728	787
» Collections » »	1	000	» Intérêts..............	42	794
» Laboratoire » »	1	000	» Cotisations	58	000
» Portefeuille	13728	308	» Diplômes	0	400
» National Bank of Egypt.	1941	087	» Vente Publications	3	000
» Cie du Gaz	4	629			
» Appointements.........	833	000			
» Publications..........	412	848			
» Frais Généraux	176	752			
» Impôts et Assurances...	56	400			
	17158	024		17158	024

Inventaire

Actif	L.E.	MM.	Passif	L.E.	MM.
Bâtiment (pour mémoire)	1	000	Réserve Générale..............	15679	024
Mobilier » »	1	000			
Bibliothèque » »	1	000			
Collections » »	1	000			
Laboratoire » »	1	000			
Portefeuille	13728	308			
National Bank of Egypt	1941	087			
Cie du Gaz....................	4	629			
	15679	024		15679	024

Le Portefeuille Titres en dépôt à la National Bank of Egypt se décompose comme suit :

155 Obligations Héliopolis 5 %.
9020 £ Dette Unifiée Egyptienne 4 %.
6700 £ Dette Privilégiée Egyptienne 3 ½ %.

Prévisions Budgétaires pour l'année 1938

Recettes **Dépenses**

Recettes	L.E.	MM.	Dépenses	L.E.	MM.
Subvention du Gouvernement Egyptien	497	000	Publications	250	000
Coupons	725	000	Appointements	819	000
Cotisations	60	000	Frais Généraux	160	000
Intérêts	40	000	Impôts	30	000
Vente Publications	5	000	Assurances	26	000
			Abonnements Bibliothèque	20	000
			Entretien Bâtiment	15	000
			Imprévus	7	000
	1327	000		1327	000

Signé: R. WILKINSON.

Repport des Censeurs :

En conformité du mandat que vous avez bien voulu nous confier, nous avons l'honneur de porter à votre connaissance que nous avons procédé à la vérification du Bilan des Comptes de la Société Royale Entomologique d'Egypte arrêtés au 31 Décembre 1937, qui vous est présenté par votre Conseil d'Administration, ainsi que des pièces y afférentes, dont nous avons reconnu la parfaite concordance avec les écritures de la Société et en indiquant clairement la situation.

Signé: Dr. A. AZADIAN et E. KAOURK.

Le Caire, le 16 Février 1938.

Décisions :

1° L'Assemblée Générale approuve les Rapports du Secrétaire Général, du Trésorier et des Censeurs et donne décharge au Conseil de sa gestion pour l'exercice 1937.

Sur la proposition de Monsieur le Professeur H. C. Efflatoun Bey, l'Assemblée remercie le Secrétaire Général et le Trésorier des efforts qu'ils ont déployés en vue de la bonne marche de la Société durant l'exercice écoulé.

Elections :

Messieurs le Professeur H. C. EFFLATOUN Bey, le Docteur KAMEL MANSOUR et A. ALFIERI, membres du Conseil sortants, sont réélus.

Monsieur le Docteur SAADALLAH MOHAMED MADWAR est élu, en remplacement de Monsieur le Professeur GUIDO TORRIANI membre du Conseil sortant.

Messieurs le Docteur A. AZADIAN et E. KAOURK sont réélus aux fonctions de Censeurs des Comptes de la Société.

Séance du 27 Avril 1938

Présidence de Monsieur le Professeur H. C. Efflatoun Bey,
Vice-Président

Adhésion :

Répondant à l'invitation faite par l'Academy of Foreign Relations, de New-York, la Société devient membre du Conseil d'Organisation de l'Institution précitée.

Dons à la Bibliothèque :

La Société a reçu les ouvrages mentionnés ci-dessous :

1° De l'Administration des Biens Privés de Sa Majesté le Roi : (a) un exemplaire des 4me et 6me Volumes de l' « Histoire de la Nation Egyptienne », par Monsieur Gabriel Hanotaux ; (b) un exemplaire, en deux Volumes, de l' « Histoire Militaire de Mohamed Aly et de Ses Fils », par Monsieur le Général Weygand.

2° De Monsieur le Docteur N. S. Royston Malœuf, de New Haven (Etats-Unis d'Amérique) : un separata de son travail « Physiology of Excretion among the Arthropoda », extrait de Physiological Reviews, Vol. 18, No. 1, 1938.

3° De Monsieur H. Z. Klein, de Rehoboth (Palestine) : un separata de ses 13 études relatives à l'entomologie, extraites de diverses revues.

4° De Monsieur le Professeur Richard Ebner, de Vienne : un separata de ses deux récents travaux sur les Orthoptères.

5° De Monsieur Henri Gadeau de Kerville, de Rouen (France) : un exemplaire du sixième fascicule de ses « Mélanges entomologiques ». Monsieur de Kerville a également fait parvenir cinq exemplaires supplémentaires de l'ouvrage précité, pour être distribués parmi les membres de la Société qui y seraient intéressés.

6° De Monsieur Alexandre Carneri, d'Alexandrie : un separata de sa note « Un Sphingide à ajouter à la faune égyptienne », extrait des Miscellanea Entomologica, Vol. XXXVIII, No. 4, pp. 1-7, 1937.

Le Conseil remercie les généreux donateurs.

Echange :

La Rivista di Biologia Coloniale, éditée à Rome, se fait inscrire pour l'échange régulier avec les publications de la Société.

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Monsieur Alexandre Carneri, d'Alexandrie, proposé par Messieurs le Professeur H. C. Efflatoun Bey et A. Alfieri.

Monsieur Henry Klein, de Rehoboth (Palestine), proposé par Messieurs le Professeur H. Priesner et A. Alfieri.

La Société du Naphte (A.I. Mantacheff et Cie), d'Alexandrie, proposée par Messieurs le Professeur H. C. Efflatoun Bey et A. Alfieri.

Le Ministère de l'Instruction Publique, Section des Dépôts, proposé par Messieurs le Professeur H. C. Efflatoun Bey et A. Alfieri.

Démissions :

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Elections :

Les votes relatifs à la constitution du Bureau du Conseil et du Comité Scientifique pour l'exercice 1938-1939 donnent les résultats ci-dessous :

Sont élus : Monsieur le Professeur H. C. Efflatoun Bey et Monsieur le Professeur H. Priesner, *Vice-Présidents ;* Monsieur Anastase Alfieri, *Secrétaire Général ;* Monsieur Richard Wilkinson, *Trésorier.*

Sont élus membres du Comité Scientifique : Messieurs le Professeur H. C. Efflatoun Bey, le Professeur Docteur H. Priesner, le Docteur Kamel Mansour et Anastase Alfieri.

The Terminalia of the Genus *Wohlfahrtia* B. & B., and those of some allied Genera, together with Notes on the Natural Grouping of the Species of the Subfamilies Sarcophaginae and Miltogrammatinae.

(with 35 Text-Illustrations)

by W. S. PATTON, M.B.

At the present time the genus *Wohlfahrtia* contains some 16 or 17 species the majority of which are found in the Palaearctic region: I know of only one species from the New World. The species are larviparous in habit and in most cases can be recognised by the short hairs on both sides of the stout proximal half of the arista, the attenuated distal half being bare, and by the round or elongated black spots or patches in longitudinal rows on the otherwise grey abdomen. Two of the species, *Wohlfahrtia magnifica* Schiner and *Wohlfahrtia vigil* Walker are well known specific myiasis-producing flies. The former causes all kinds of tissue myiasis depositing its larvae in wounds, cuts, etc., and particularly on the conjunctiva in Egypt the larva or larvae causing internal opthalmomyiasis; it is also a serious pest of animals causing much suffering and pecuniary loss. *Wohlfahrtia vigil* causes myiasis in children and in animals in Canada depositing single larvae on the unbroken skin. The biology of this species has been worked out by Walker (1920) and recently in particular by Ford (1932) who notes that Walker discovered the natural habitat of *vigil* to be along railway tracks. Ford has investigated the behaviour of *vigil* in the laboratory, and notes that a high temperature induces the deposition of larvae and suggests that the warmth of railway lines exerts a definite attraction which accounts for the presence of the flies in their vicinity. Four further cases of myiasis in infants are recorded from Toronto. In each case the child had slept out of doors within a short distance of a railway. I assume that *Wohlfahrtia vigil* normally parasitises some small animal living in burrows near railways. It is possible that some of the other species of *Wohlfahrtia* occasionally cause myiasis. Some of the desert species are probably insect parasites.

In the present paper I propose describing shortly and illustrating the terminalia of five species, and at the same time noting and illustrating the terminalia of some species of allied genera, and in particular drawing attention to the natural grouping of the species of the sub-family Sarcophaginae based on my studies of the terminalia. I do not intend to describe the external characters of the five species dealt with in this paper as Dr. Hassan Hilmi Salem is at present engaged in completing a monograph of the known species of *Wohlfahrtia*. I am indebted to Dr. Salem for specimens of *Wohlfahrtia magnifica, trina, indigens* and *Agria latifrons;* to Mr. Col-Bran J. Wainwright for specimens of *Brachycoma devia, Miltogramma punctata, germari, Metopia leucocephalas* and *Sphecapata conica;* to Dr. Villeneuve for specimens of *Helicobosca muscaria* and *distinguenda*. The specimens of *Wohlfahrtia* collected by me in Iraq and identified by the late Prof. M. Bezzi as *meigeni* Schin. proved to be *Wohlfahrtia nuba* Wied. when re-examined by Dr. H. Salem. I have long had a specimen in my collection of *Pseudosarcophaga* (*Agria*) *affinis* and one of *Paraphyto opaca* determined by Dr. Parker; also a specimen of *Wohlfahrtia meigeni* from the New World determined as such by the late Dr. Aldrich. Lastly I wish to express my thanks to Dr. Norma Ford for many bred specimens of *Wohlfahrtia vigil*.

Before describing the terminalia of *Wohlfahrtia* it may be of use to describe the technique I employ in the study of the terminalia, and particularly those of the female. As is well known it is almost impossible to identify the females of the species of the Sarcophaginae, and particularly species of *Sarcophaga* on external characters, and as a result most keys to the species are only of use for the identification of the males. In a recent series of papers by Patton and Wainwright (1935a, 1935b, 1936a, 1936b) special attention has for the first time been paid to the study of the terminalia of the females of the British species of *Sarcophaga* and those of several have been illustrated. These studies have conclusively proved that the ♀ terminalia provide characters for the identification of this sex which are as valuable as those of the terminalia of the male; the structure of the parts is specific for each species. Further it has been found by one of the authors (C.J.W.) that there are quite a few reliable external characters which can be used with those of the terminalia for identifying the females with certainty. The study of the female terminalia are, however, difficult, and call for a special technique. The important diagnostic characters are to be found mainly in the shape, etc., of the sixth, seventh and ninth sterna. Unfortunately these plates are often obscured in specimens either by the overlapping terga, or by the shrivelling of the parts. This together with their often dark colour renders it difficult to make out their exact shape and structure by examining the ventral surface of abdomen even with a good light and a binocular mi-

croscope. It is best, therefore, to examine fresh specimens by compressing the abdomen and extending the larvipositor as much as possible. In dried specimens it is as a rule necessary to remove the abdomen, the part of the body which does not provide any important external characters for identification. In many species the terminalia are yellow, a character of considerable use.

Technique for the Study of the Female Terminalia.

Having removed the abdomen it should be placed in 10 per cent caustic potash; and when soft, compression of it often extrudes the larvipositor. While still in the potash, and when the soft parts are dissolved, the fifth and following segments should be dissected away from the rest of the abdomen with a pair of needles under a binocular microscope taking particular care not to damage the fifth sternum when separating it from the fourth. A round blunt needle should now be passed into the end of the abdomen, and the larvipositor gently pushed out to its full extent. Later when the parts are sufficiently cleared the potash should be washed out with several changes of water with a pipette, and replaced by 70 per cent alcohol. After about half an hour the 70 per cent alcohol should be replaced by two changes of absolute alcohol, and after an hour the alcohol changed for clove oil. After making certain that the larvipositor is fully extended, the firth tergum should be dissected away by detaching it from the sixth taking care to leave the fifth sternum attached to the sixth. The specimen is now ready to be mounted. Care should be taken at this stage to retain the spermathecae and signum (if present). A drop of fairly thick Canada Balsam is now placed on a slide, and the specimen lifted out of the clove oil and placed in the balsam with the ventral surface uppermost. When the balsam has set the specimen should be carefully orientated by dipping a needle in Xylol and moving it until it lies in such a position that the sterna and other parts are clearly visible and are all on a level; this manipulation may take several days. When the specimen has set in the best position in which all the parts can be illustrated it is now slowly covered with some liquid balsam taken up on a needle until it is entirely immersed in balsam; when finally set it is ready to be illustrated. The illustrations accompanying this paper and the many others recently published were drawn from such specimens. In such specimens one obtains a clear view of the sterna, etc., so that they can be accurately depicted as seen. It is impossible to obtain such a clear view of the parts by examining the end of the abdomen even under the best conditions. In these whole mounts of the end of the abdomen it is impossible to depict the exact structure of the parts particularly that of the sterna for the simple reason that as they are still attached to the sixth tergum they are often bent round and are not flat, and commonly appear foreshortened. In order, therefore, to depict them accurately it is necessary to dissect them off and mount them flat. When the

drawing of the entire terminalia is completed, and if only one specimen is available, it is removed from the slide by placing it in a petri dish containing xylol, and then transferring the specimen back to the dish of clove oil. All the sclerites are now dissected off with needles great care being taken not to damage the sterna. The fifth, sixth, seventh and ninth sterna are now detached from tergum six by cutting the membrane close to the sterna and continuing the dissection up to the genital opening. Great care is necessary at this point to detach the seventh and ninth sterna intact. I am assuming that the structure at the end of the seventh sternum is the ninth. In many of the species of *Sarcophaga* the ninth sternum is membranous forming the ventral lip of the genital opening; it varies markedly in structure in the different species. In *Sarcophaga falculata* for instance it is a large lobed membranous structure which appears to surround the seventh sternum; in *Sarcophaga rosselei* it is a smaller chitinous plate with a clear round area in the middle; in *Sarcophaga melanura* it is a small chitinous plate; in *Sarcophaga striata* it is a large plate with latero-ventral horns. Its structure and that of the sixth and seventh sterna is characteristic of each species. The fifth, sixth, seventh and ninth sterna may now be separated from each other and placed in a line in a small drop of liquid Canada balsam on a slide, and gently pressed until they lie quite flat. The sixth tergum is next dissected away from the membranous area between it and the anal cerci by cutting the membrane close to the posterior edge of the tergum. The sixth tergum is then placed in the balsam at the side of the sterna. The signum (if present), and the spermathecae, are now dissected away and placed in the balsam noting when doing so which surface of the signum is uppermost as the two sides often vary in structure. The tenth sternum with the anal cerci is then dissected away from the membranous dorsal area which bears the seventh tergum, and is placed in the balsam with the sternum uppermost. Lastely the membranous area in which the seventh tergum (if present) lies is mounted with the tergum uppermost. The seventh tergum may or may not be present, and if so in *Sarcophaga* it is generally in two parts. In some species, *Sarcophaga aratrix* for instance, there are several plates in the membranous area, and their shape and arrangement are very characteristic of this species. When the balsam has set the parts can be arranged by taking a drop of fluid balsam on the end of a needle and placing it over them and then arranging them so that they can be drawn in as natural a position as possible; this may take days and when they have finally set in position they are covered with drops of fluid balsam. The tenth tergum (if present) can be drawn later by turning over the part bearing the tenth sternum and anal cerci with the aid of some fluid balsam on the end of a needle. In carrying out the manipulation of these parts it is essential to use only small quantities of balsam otherwise it will be found that the parts will float about. On no account should a cover-slip be placed over the parts for it will only compress and distort them. In

studying these sclerites, etc., particular attention should be paid to the sixth tergum to see if it is divided into two separate plates joined by membrane; it is so divided in many species of *Sarcophaga* and the notch at the division affords a useful diagnostic character. In many species of *Sarcophaga* there is an accessory plate attached to the proximal side of the tenth sternum forming the dorsal wall of the genital opening. The presence or absence of this plate, and if present its shape and extent, are of the first importance in identification. It is present in *Sarcophaga dissimilis*, *pumila*, *frenata*, *haemorrhoea* and others of the British species so far studied, and its shape is characteristic of each species. This plate cannot, of course, be seen without dissection. The presence or absence of the signum (and its structure) is also a useful character but here again it can only be noted when the parts are dissected. The spermathecae too are of a characteristic shape in many of the species. The anal cerci do not afford any useful characters.

In connection with the ♂ terminalia it is important to dissect away all the parts, to mount the anal cerci and ninth coxites both with ventral surface uppermost and laterally so as to illustrate them in both positions; sometimes too it is useful to illustrate the tenth tergum. It is also important to mount and illustrate the fifth sternum and ninth tergo-sternum as in the case of the sclerites of the ♀ terminalia and to get the former quite flat it is necessary to dissect off the sixth sternum from its dorsal surface. The phallosome with both parameres should be dissected off from the ninth tergo-sternum noting when doing so whether the anterior part of the paramere is fused with the dorsal surface of the ninth tergo-sternum (as in some species of *Wohlfahrtia*), or whether it is only articulated by a suture. This part of the dissection is most difficult and requires great care otherwise the ninth tergo-sternum may be damaged. The phallosome and attached parameres are mounted laterally and great care is necessary to get it exactly in side view for the slightest tilt will alter the appearance of the two parts of the parameres and wrong conclusions may be drawn as to their structure especially their ends for in one view the end of the anterior paramere may appear pointed and in another rounded; I cannot too strongly emphasize this point. It will be noted then that to take full advantage of the characters of the terminalia it is necessary to follow the technique given above and to note the characters of the parts (and illustrate them) when mounted without compression under a coverslip. These preparations are permanent but at any time the parts may be removed with xylol and orientated in some other position, whereas once a coverslip has been put over them they not only get permanently distorted and are useless for further study. I sincerely hope others will take up the study of the terminalia of the higher Diptera and especially those of the females, and will depict them so that in time we shall have illustrations which will enable us to classify them better and to understand their true relationships. At present the genus *Sarcophaga* (and other allied

genera) are being split up into smaller genera on external characters the significance of which is not understood, as well as on incomplete studies of the ♂ terminalia; the importance of the ♀ terminalia has been entirely overlooked. I believe they are of great value in understanding the relationships of the species.

SUBFAMILY SARCOPHAGINAE
Tribe AGRINI

The Terminalia of some species of the genus Wohlfahrtia

Wohlfahrtia magnifica Schiner

Male: The first important point to note in connection with the terminalia of *Wohlfahrtia* is that the intersegmental membrane between segment five and seven is not loose as in *Sarcophaga* so that the end segments cannot be drawn away from the proximal ones (Fig. 1); they are closely applied the length of the intersegmental membrane being normal. Sternum 5 in *Wohl-*

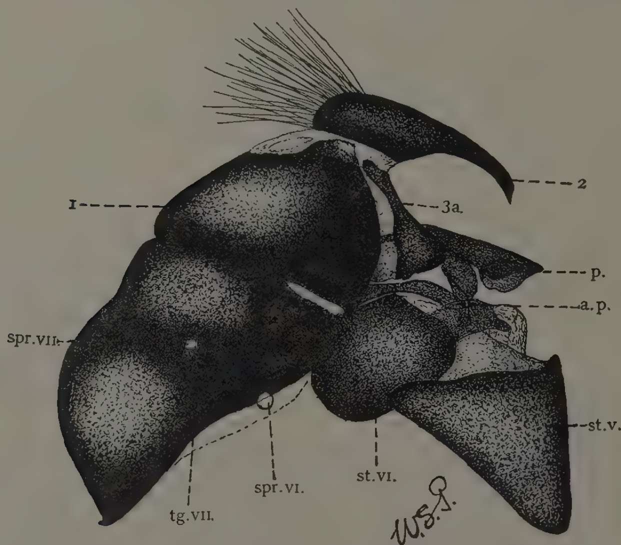

Fig. 1. — Seventh and tenth terga, anal cercus, distal segment of ninth coxite, phallosome, sixth and fifth sterna of *Wohlfahrtia magnifica* in side view. *1.* Tenth tergum; 2. Anal cercus; *3a.* Distal segment of ninth coxite; *a.p.* Anterior paramere; *p.* Phallosome; *st.v.*, *st.vi.* Fifth, sixth sterna; *spr.vi.*, *spr.vii.* Sixth, seventh spiracles; *tg.vii.* Seventh tergum. — Note absence of loose membrane between segments 5 and 7, and structure of distal segment of ninth coxite.

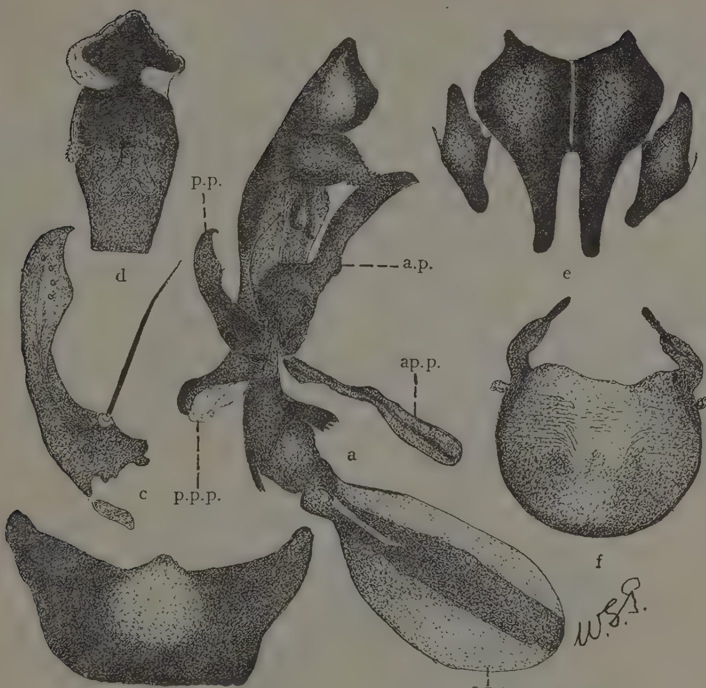

Fig. 2. — *a*. Phallosome and paramere of *Wohlfahrtia magnifica* in side view: *a.p.* Anterior paramere; *ap.p.* Apodeme of phallosome; *p.p.* Posterior paramere; *p.p.p.* Posterior process of phallosome; *s.p.s.* Sperm pump sclerite; *b*. Fifth sternum; *c*. Posterior paramere; *d*. Dorsal view of end of phallosome showing concavity; *e*. Ventral view of anal cerci and distal segments of ninth coxites; *f*. Ninth tergo-sternum.

fahrtia, and in allied genera, is a wide bent plate markedly convex in the middle line distally, and is not forked, and only has a few hairs as a rule along the distal margin. Sternum 5 of *Wohlfahrtia magnifica* is illustrated in Figs 1 and 2, and that in Fig. 2 is fore-shortened as it is drawn from a specimen mounted as noted above, and does not show its full length (see Fig. 1). Terga 7 and 10 are illustrated in Fig. 1. The ninth coxite (Fig. 1) is represented only by the distal segment which is a long plate attached along the anterior border of tergum 10 (Figs. 1, 2). It is expanded and is slightly bent inwards at its upper free end and narrowed at its lower and where it terminates close at the side of the anal cercus; the proximal segment is wanting. The ninth tergo-sternum (Fig. 2 f) is a wide rounded plate the posterior arms bending round towards each other. Each anal cercus (Fig. 1,

2e) is a long rounded plate bent upwards and ending in a sharp point; about half of the anterior end is free (Fig. 2e-e), the remaining half is joined to its fellow and is wide and round.

The phallosome (Fig. 2a) is relatively short, convex ventrally and deeply concave dorsally the end being expanded; this is well shown in Fig. 2d. About the middle of the dorsal end there is a finger-like process on each side, its base wide and round and the end heavily armed with fine short spines. The ejaculatory duct opens in the middle line between the two processes and is supported by chitinous rods on each side; the posterior process (Fig. 2a) is short and wide; the apodeme (Fig. 2a) is short and narrow in side view. The anterior paramere (Fig. 2a) is a long wide plate expanded at the base, the outer surface is rounded and the end is bluntly pointed. The posterior paramere (Fig. 2a, c) is an upstanding plate expanded somewhat at the end with many fine sensory hairs, and the end is bluntly pointed and bent; there is a long stout hair at the base; there is a small supporting sclerite.

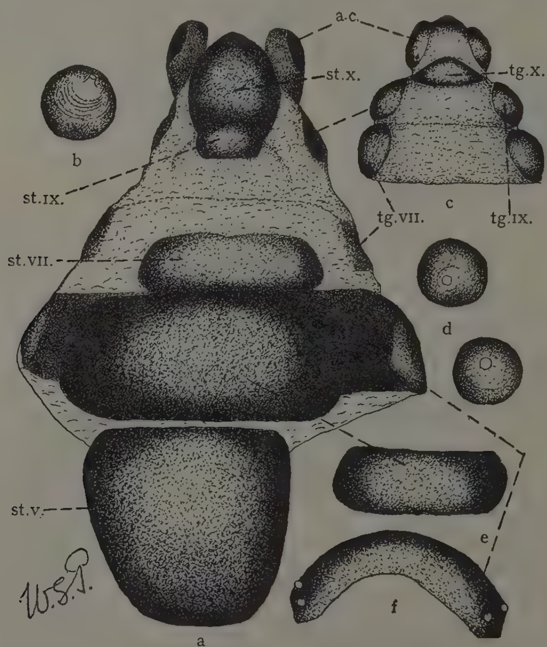

Fig. 3. — *a.* Ventral view of extended larvipositor of *Wohlfahrtia magnifica*; *a.c.* Anal cerci; *st.v.*, *st.vii.*, *st.ix.*, *st.x.* Fifth, seventh, ninth and tenth sterna; *b.* One spermatheca; *c.* Dorsal view of end of larvipositor; *tg.vii.*, *tg.ix.*, *tg.x.* Seventh, ninth and tenth terga; *d.* The two other spermathecae; *e.* Sixth sternum; *f.* Sixth tergum.

Female (Fig. 3) : The larvipositor is relatively long and all the sterna and terga are well developed. Tergum 6 (Fig. 3f) is not divided and sternum 6 (Fig. 3e) is a long wide plate. Terga 7 and 9 are only chitinised at the sides (Fig. 3c). Sternum 9 is a small plate lying in the middle line ventral to the genital opening and is rounded distally. Tergum 10 is a small wide triangular-shaped plate (Fig. 3e) and sternum 10 (Fig. 3a) is an elongated plate. The anal cerci (Fig. 3a, c) are large round plates. The spermathecae are rather flat and round simulating miniature bowls. The signum is wanting.

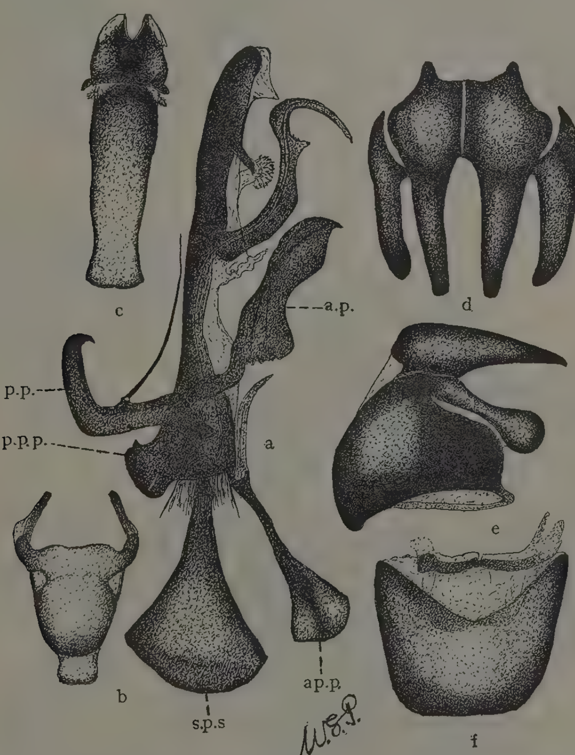

Fig. 4. — *a*. Phallosome and one paramere of *Wolhfahrtia trina* in side view: lettering as in Fig. *2a*; *b*. Ninth tergo-sternum; *c*. Dorsal view of end of phallosome showing concavity; *d*. Ventral view of anal cerci and distal segments of ninth coxites; *e*. Lateral view of tenth tergum, anal cercus and distal segment of ninth coxite; *f*. Fifth sternum.

Wohlfahrtia trina Wiedemann

Male Terminalia (Fig. 4) : Sternum 5 is very similar to that of *Wohlfahrtia magnifica*. The ninth tergo-sternum (Fig. 4b) is long and narrow.

The distal segment of the ninth coxite is long and similarly attached to tergum 10 (Fig. 4d) ; its upper free end is round and not so large as that of *Wohlfahrtia magnifica*, and is directed inwards towards its fellow. Each anal cercus (Fig. 4d, e) is a wide rounded plate tapering towards the free end which is blunt and slightly bent upwards ; about three-quarters of the anterior end is free ; the remainder is wide and joined to its fellow (Fig. 4d). The phallosome (Fig. 4a) is long and narrow, and at first sight appears to be structurally different from that of *Wohlfahrtia magnifica*, but when examined from the dorsal side (Fig. 4c) it will be noted that it is also deeply concave on the dorsal face and convex ventrally. Near the distal end there is on each side a small finger-like spined membranous process and a curved narrow chitinous plate dorsal to it. The striking character is the extension of the ejaculatory duct into a long narrow dorsal chitinous process situated about the middle and bent into a fine pointed hook-like end. The posterior process

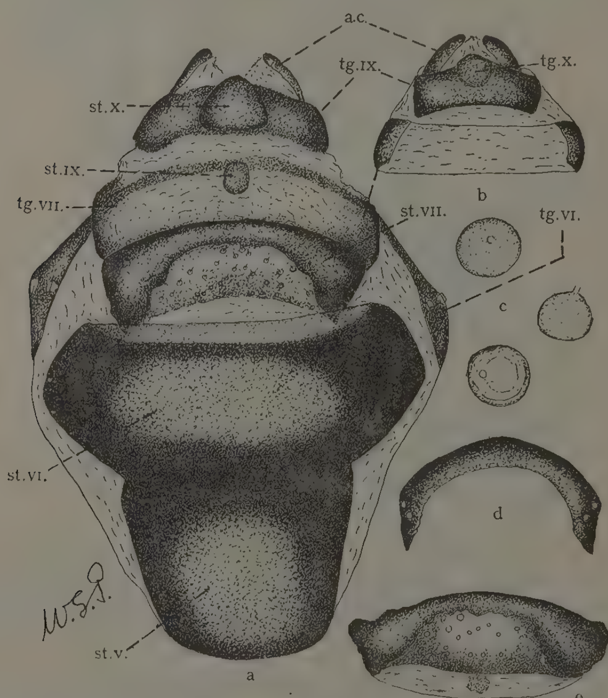

Fig. 5. — *a*. Ventral view of extended larvipositor of *Wohlfahrtia trina:* lettering as in Fig. *3a; b*. Dorsal view of end of larvipositor; lettering as in Fig. *3c*; *c*. Spermathecae; *d*. Sixth tergum; *c*. Seventh sternum.

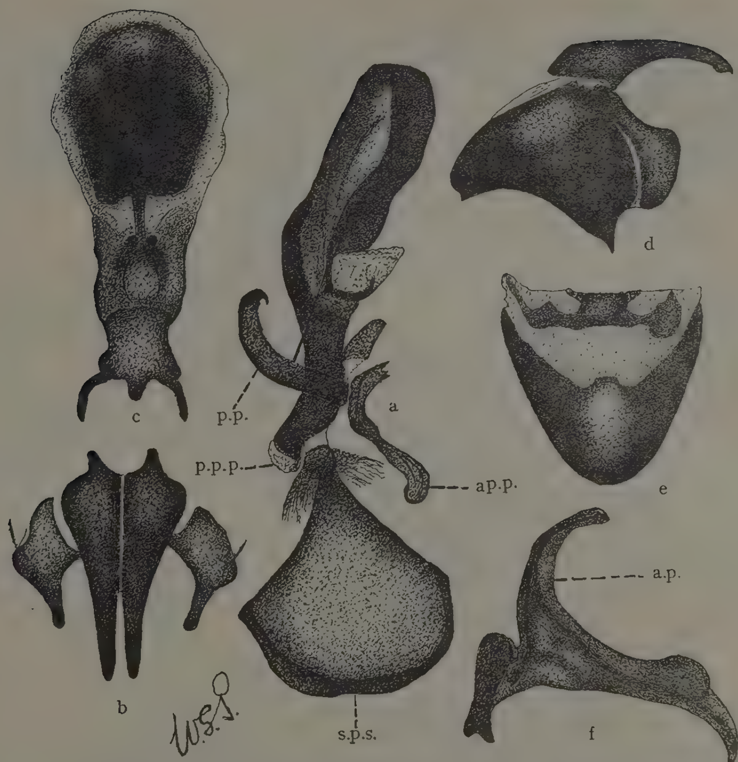

Fig. 6. — *a.* Phallosome and posterior paramere of ***Wohlfahrtia indigens*** in side view; lettering as in Fig. *2a; b.* Ventral view of anal cerci and distal segments of ninth coxites; *c.* Dorsal view of end of phallosome showing concavity; *d.* Lateral view of tenth tergum, anal cercus and distal segment of ninth coxite; *e.* Fifth and sixth sterna; *f.* Ninth tergo-sternum in side view showing attached anterior part of paramere.

(Fig. 4a) of the phallosome is short and wide, and the apodeme is short and narrow in side view and expanded at the end. The anterior paramere (Fig. 4a) is a wide plate similar in general structure but wider than that of *Wohlfahrtia magnifica*, and the attached end is long and narrow; the distal part ends in short curved point; the posterior paramere (Fig. 4a) is a long bent plate the distal end rising at right angles to the proximal with a long stout hair about the middle.

Female Terminalia (Fig. 5): The ♀ terminalia are structurally similar to those of *Wohlfahrtia magnifica*. Tergum 6 (Fig. 5d) is not divided; sternum 6 (Fig. 5a) is a long very wide plate. Tergum 7 (Fig. 5a) is represented by two small rounded plates at the sides; sternum 7 (Fig. 5a, e) is a

very characteristic plate, and is long and rather wide, the strongly chitinised part shaped as shown in Fig. 5e; the emarginated part is lightly chitinised and is armed with short hairs. Tergum 9 (Fig. 5b) is a wide rectangular plate while sternum 9 (Fig. 5a) is a small plate. Tergum 10 (Fig. 5b) is a small round plate and sternum 10 (Fig. 5a) is triangular-shaped. The spermathecae are shaped somewhat like those of *magnifica*. The signum is wanting.

Wohlfahrtia indigens Villeneuve

Male Terminalia (Fig. 6): Sternum 5 (Fig. 6e) is very similar to that of *Wohlfahrtia magnifica* and *trina*. The ninth tergo-sternum (Fig. 6f) is rather broad and the anterior paramere is firmly attached to it (Fig. 6f). The distal end of the ninth coxite (Fig. 6d) is structurally similar to that of *Wohlfahrtia magnifica* and *trina;* the upper free end is longer and wider. Each anal cercus (Fig. 6d) is long the anterior third free and narrowing is expanded just before the end terminating in a short bent point; the ventral view is shown in Fig. 6b. The posterior three-quarters is closely united to its fellow, is rather wide and ends in a blunt pointed proce-s. The phallosome (Fig. 6a) is long and rather narrow basally and is expanded distally hood-like and is deeply concave (Fig. 6a, c); there is a short membranous process about

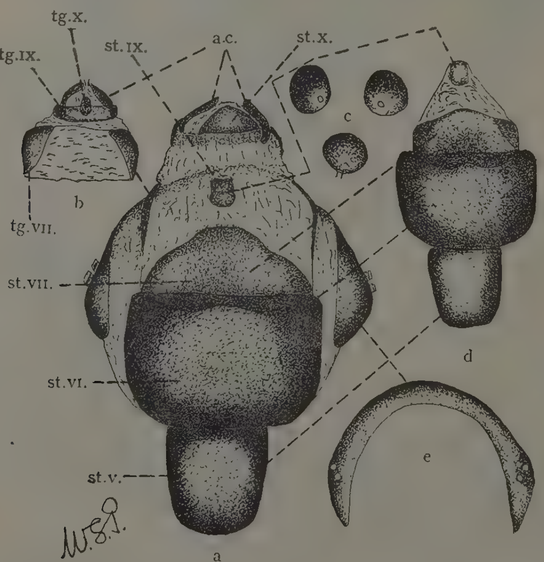

Fig. 7. — *a.* Ventral view of extended larvipositor of *Wohlfarhtia indigens*; lettering as in Fig. *3a; b.* Dorsal view of end of larvipositor; lettering as in Fig.*3c*; *c.* Spermathecae; *d.* Fifth, sixth, seventh and ninth sterna; *c.* Sixth tergum.

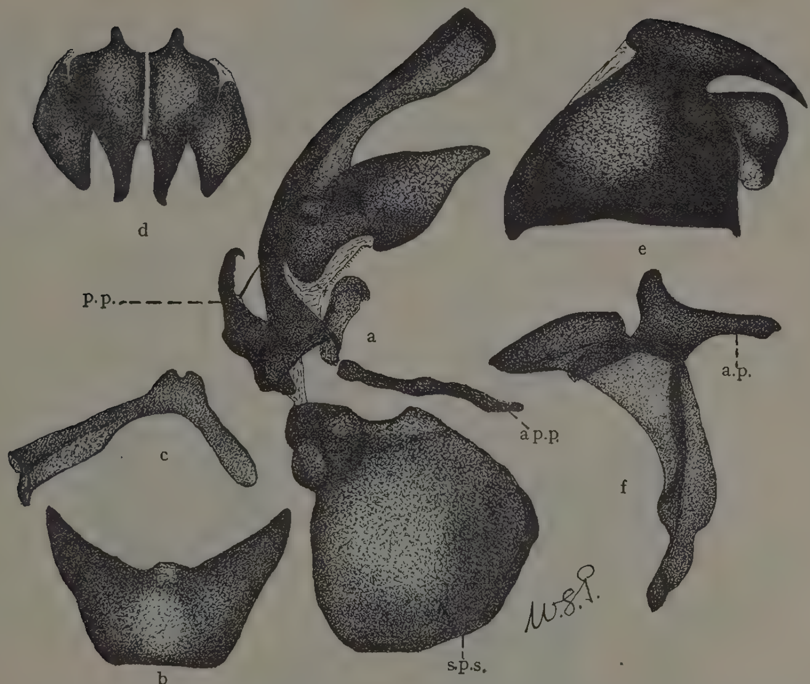

Fig. 8. — *a.* Phallosome and posterior part of paramere of *Wohlfahrtia nuba* in side view; lettering as in Fig. *2a; b.* Fith sternum; *c.* sixth sternum; *d.* Ventral view of anal cerci and distal segments of ninth coxites; *e.* Lateral view of tenth tergum, anal cercus and distal segment of ninth coxite; *f.* Lateral view of ninth tergo-sternum and attached anterior part of paramere.

the middle supported on each side by a curved chitinous rod. The anterior paramere (Fig. 6f) is fused to the upper surface of the ninth tergo-sternum; the posterior paramere (Fig. 6a) is a narrow bent rod-like plate, the free end with a pointed hook. The posterior process of the phallosome (Fig. 6a) is short and project downwards and the apodeme (Fig. 6a) is very short; the sperm pump sclerite (Fig. 6a) is relatively large.

F e m a l e T e r m i n a l i a (Fig. 7): Tergum 6 (Fig. 7e) is not divided; sternum 6 (Fig. 7a) is a long wide plate. Tergum 7 is well developed at the sides; sternum 7 (Fig. 7a, d) is wide but shorter and tends to narrow to a rounded blunt point anteriorly in the middle. Tergum 9 (Fig. 7b) is a narrow long ribbon-like plate; sternum 9 (Fig. 7a) is a small rectangular plate. Tergum 10 (Fig. 7b) is a small oval plate while sternum 10 (Fig. 7a) is a wide triangular-shaped plate. The anal cerci are rather long and narrow. The signum is wanting.

Wohlfahrtia nuba Wiedemann.

Male Terminalia (Fig. 8): Sternum 5 (Fig. 8b) is similar to that of the other species. The ninth tergo-sternum (Fig. 8b) is wide and long, the anterior paremere fused to it (Fig. 8f). The distal segment of the ninth coxite (Fig. 8e) is broad the rounded free end turned inwards; the proximal segment is wanting. Each anal cercus (Fig. 8e) is a wide round plate narrowing to the end to a fine point; about the anterior third is free, the remainder

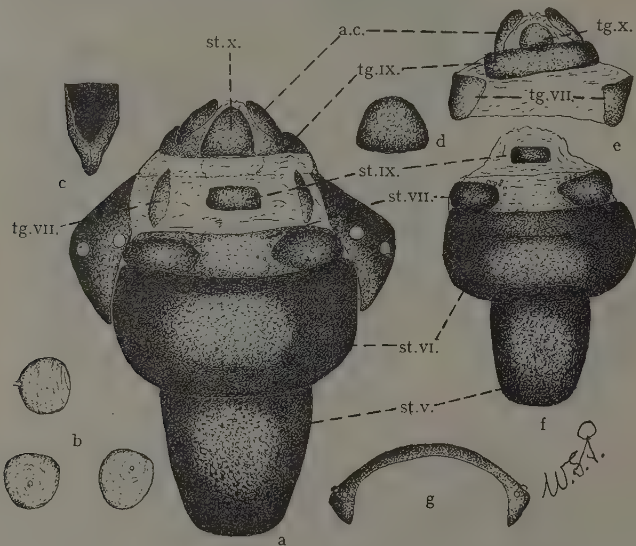

Fig. 9. — *a.* Ventral view of extended larvipositor of *Wohlfahrtia nuba;* lettering as in Fig. *3a; b.* Spermathecae; *c.* Signum of uterus; *d.* Tenth sternum; *e.* Dorsal view of end of larvipositor; lettering as in Fig. *3c; f.* Fifth, sixth, seventh and ninth sterna; *g.* Sixth tergum.

wide and joined to its fellow (Fid. 8d). The phallosome (Fig. 8a) is long and narrow convex ventrally and hollowed out dorsally. Near the base there is on each side a characteristic long, wide bluntly pointed process; the proximal part of the phallosome is short and narrow. There is practically no posterior process and the apodeme (Fig. 8a) is short, narrow and bent in side view. The sperm pump sclerite (Fig. 8a) is very large. The anterior paramere (Fig. 8f) is a wide plate bluntly pointed at both end and is firmly attached to the ninth tergo-sternum. The posterior paramere (Fig. 8a) is a short slightly bent plate ending in a pointed hook; there is a long stout hair nearer the distal than the proximal end.

Female Terminalia (Fig. 9) : Tergum 6 (Fig. 6g) is not divided;

sternum 6 (Fig. 9a, f) is a long wide plate. Tergum 7 (Fig. 9a) is represented by rounded plates at the sides; sternum 7 (Fig. 9a, f) is a long narrow plate, the sides strongly chitinised. Tergum 9 (Fig. 9a, e) is a wide rather narrow plate and sternum 9 (Fig. 9a, f) is a small rectangular plate. Tergum 10 (Fig. 9c) is a triangular-shaped plate. The anal cerci (Fig. 9a, e) are long and rather narrow. The signum (Fig. 9c) is present and is long and densely chitinised anteriorly. The spermathecae (Fig. 9b) are somewhat similar to those of *Wohlfahrtia magnifica.*

Wohlfahrtia vigil Walker

Male Terminalia (Fig. 10): Sternum 5 (Fig. 10d) is very similar to that of the others. The ninth tergo-sternum (Fig. 10e) is short and wide, the anterior part of the paremere firmly fused to it. The distal segment of the ninth coxite (Fig. 10c) is similar to those of the other species, the free dorsal end is short and round, the ventral part long and narrow. Each anal cercus (Fig. 10b, c) is short, bluntly pointed and about three-quarters of the anterior end is free (Fig. 10b), the remainder is joined to its fellow; the posterior part is wide with a short squarly ending process. The phallosome (Fig. 10a) is short, rather narrow and rounded at the distal end, convex ventrally and concave dorsally; there is a long semi-membranous, spined,

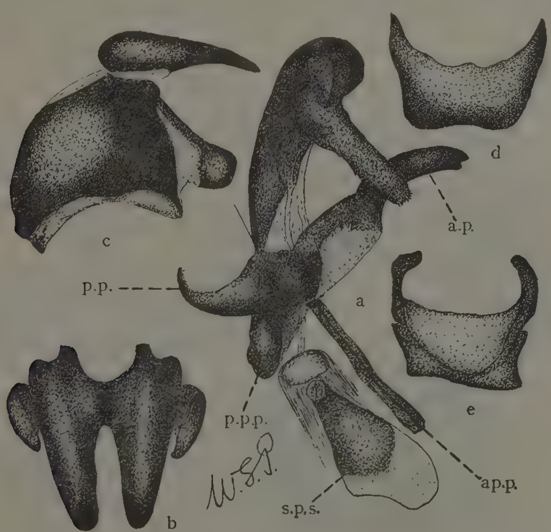

Fig. 10. — *a.* Phallosome and paramere of *Wohlfahrtia vigil* in side view; lettering as in Fig. *2a; b.* Ventral view of anal cerci and distal segments of ninth coxites; *c.* Lateral view of tenth tergum, anal cercus and distal segment of ninth coxite; *d.* Fifth sternum; *e.* Ninth tergo-sternum.

finger-like process projecting from each side of the distal end; the ejaculatory duct opens between them on a short process supported by chitinous rods; the posterior process (Fig. 10a) is short and rounded; the apodeme is short and narrow in side view; the sperm pump sclerite (Fig. 10a) is large. The anterior paramere (Fig. 10a) is a long, bent rod-like plate with a slightly forked end; the posterior paramere (Fig. 10a) is a short curved plate the narrow end bent; it has one long hair near the base and several sensory hairs.

It should be noted here that I have examined the terminalia of the specimen of *Wohlfahrtia opaca* and those of the specimen of *Wohlfahrtia meigeni* from the New World referred to earlier in this paper and can find no difference between them and those of the typical *Wohlfahrtia vigil*. I doubt very much if *Wohlfahrtia meigeni* occurs in the New World.

Female Terminalia (Fig. 11): Tergum 6 is undivided (Fig. 11e); sternum 6 (Fig. 11a) is long and very wide. Tergum 7 is well developed at each side as in the other species. Sternum 7 (Fig. 11a) is a short wide plate almost as wide as sternum 6. Tergum 9 like tergum 7 is developed at the sides, and sternum 9 (Fig. 11a) is a small rectangular plate. Tergum 10 is a small triangular plate as is also sternum 10. The anal cerci are small rounded plates and the spermathecae are elongated.

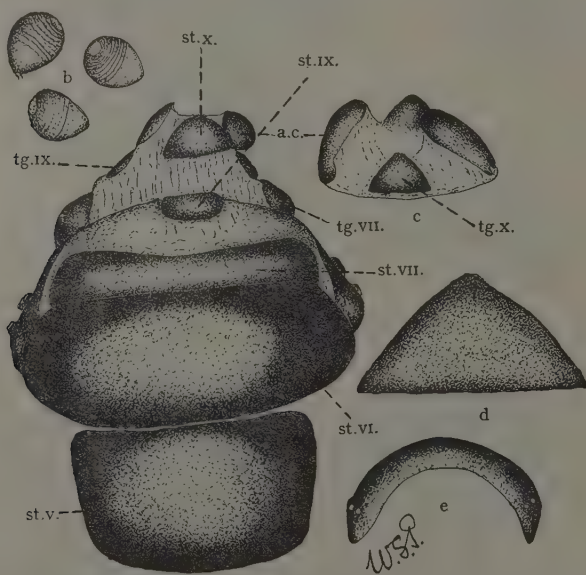

Fig. 11. — *a*. Ventral view of extended larvipositor of *Wohlfahrtia vigil;* lettering as in Fig. *3c; b*. Spermathecae; *c*. Dorsal view of end of larvipositor; lettering as in Fig. *3c; d*. Tenth sternum; *e*. Sixth tergum.

From the study of the terminalia of the above five species of *Wohlfahrtia* we are in a position to give the terminalic characters of the genus; slight modifications may be necessary later when the terminalia of the remaining species have been studied and illustrated.

Terminalic Characters of the Genus *Wohlfahrtia*

Male : Segment 5 of abdomen not separated from segment 7 by a loose membrane, but closely applied to it in the normal way. Tergum 6 usually wanting. Sternum 5 a rounded shining plate not forked and convex in the middle, the anal cerci tucked in above it. Anal cerci strongly developed curved, pointed plates joined together posteriorly. Proximal segment of ninth coxite wanting; distal segment a long plate attached along anterior border of tergum 10, its upper end usually expanded turned inwards and forming a modified lateral clasper. Phallosome either broad or narrow, the long distal portion hollowed out on its dorsal surface forming either a wide or narrow trough, the distal end rounded and bearing long or short, narrow or wide finger-like spinose process on each side; the ejaculatory duct either opening at the end of a conspicuous curved chitinous process, or at the end of an inconspicuous projection in the hollow on the dorsal surface. Posterior process of phallosome either short or wanting; apodeme short, and sperm pump sclerite usually large. Anterior part of paramere commonly fused to upper surface of ninth tergo-sternum, and usually a wide pointed rod-like plate; posterior part an upstanding, sometimes bent, plate with a long basal hair.

Female: Larvipositor relatively long as compared to that of *Sarcophaga*. Tergum 6 not divided; sternum 6 usually a long wide convex plate. Tergum 7 usually narrower and varying in shape and ornamentation. Sternum 9 usually small. Terga 7 and 9 usually incomplete and only chitinised at sides. Sternum 10 usually a large plate. Tergum 10 smaller and generally triangular. Spermathecae variable, often rather flat. The signum may or may not be present.

I shall now note and illustrate the terminalia of some typical species of genera allied to *Wohlfahrtia*.

Agria latifrons Fallen

Male Terminalia (Figs. 12, 13): No loose membrane between segments 5 and 7 of abdomen (Fig. 12). Sternum 5 (Figs. 12, 13b) structurally similar to that of *Wohlfahrtia*, raised in the middle and not forked as is *Sarcophaga*. Ninth tergo-sternum (Fig. 13g) short and wide and anterior paramere rather strongly fixed to its upper surface. Distal segment of ninth coxite (Fig. 12) a large bilobed spined plate, the ventral lobe large and rounded, the dorsal narrower and bluntly pointed, and bent downwards and inwards; proximal segment wanting. Each anal cercus (Figs. 12, 13) small,

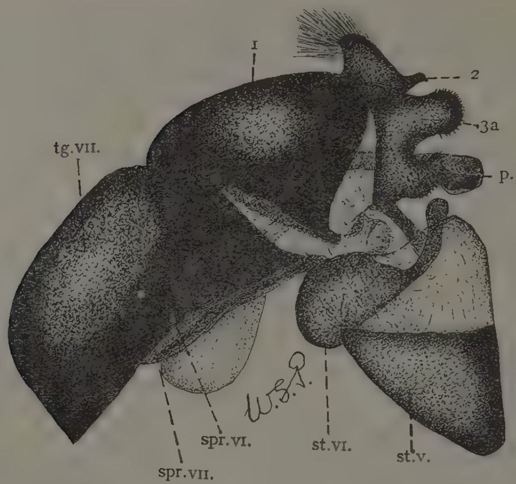

Fig. 12. — Seventh and tenth terga, anal cercus, distal segment of ninth coxite, phallosome, sixth and fith sterna of *Agria latifrons* showing characteristic Agrini type of fifth sternum; lettering as in Fig. 1.

Fif. 13. — *a*. Phallosome and paramere of *Agria latifrons* in side view; lettering as in Fig. *2a; b*. Fifth sternum; *c*. Sperm pump sclerite; *d*. Ventral view of anal cerci and distal segments of ninth coxites; *e*. Anterior paramere; *f*. Posterior paramere; *g*. Ninth tergo-sternum.

anterior free end narrow shaped like the head of a bird with a short beak bent upwards; the posterior part joined to fellow, raised and very hairy (Fig. 12). The phallosome (Fig. 13a) is short, the distal end rounded, convex ventrally and concave dorsally; a long narrow finger-like, spinose process on each side of the distal end, the ejaculatory duct opening in the middle line just distal to the processes. The posterior process of phallosome (Fig. 13a) short and bent upwards; the apodeme (Fig. 13a) long and wide; the sperm pump sclerite (Fig. 13a) is long and wide the rounded proximal end closely applied to end of body of phallosome, the head often projecting into the cavity (Fig. 13a). The anterior part of paramere (Fig. 13a, e) is long and wide ending in a short hooked point, and bears along the distal end ventrally a thick brush of hairs; posterior part of paramere is long and narrow, the distal end narrow and bent up, but it may appear to end in a point if seen dorso-ventrally (Figs. 13a).

Female Terminalia (Fig. 14): Tergum 6 (Fig. 14i) is undivided, and sternum 6 (Fig. 14a, h) is long and wide. Tergum 7 is well developed at sides but mainly membranous in middle; sternum 7 (Fig. 14a, g) is a rectangular plate varying in width with a blunt projection at middle of proximal end. Tergum 9 (Fig. 14f) a narrow plate extending across the dorsum of segment and widening at sides; sternum 9 (Fig. 14a) is an almost square plate. Tergum 10 (Fig. 14f) is a small triangular plate; sternum 10 (Fig. 14a)

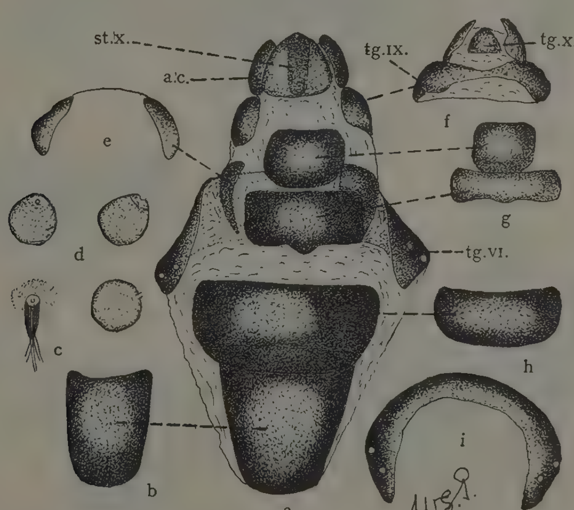

Fig. 14. — *a.* Ventral view of extended larvipositor of *Agria latifrons;* lettering as in Fig. *3a; b.* Fifth sternum; *c.* signum; *d.* Spermathecae; *e.* Seventh tergum; *f.* Dorsal view of end of larvipositor; lettering as in Fig. *3c; g.* Seventh and ninth sterna; *h.* Sixth sternum; *i.* Sixth tergum.

is a large plate the centre darkly chitinised. The anal cerci are rather long and narrow. The spermathecae are round and the signum is small.

Agria latifrons is a widely distributed Palaeartic species and is common in Egypt. It is interesting to note that the terminalia suggest close relationship with *Wohlfahrtia* (especially *vigil*, compare phallosome of two species).

Pseudosarcophaga (Agria) affinis Fallen

Male Terminalia (Fig. 15) : No loose membrane between segments 5 and 7 of abdomen. Sternum 5 (Fig. 15g) structurally similar to that of

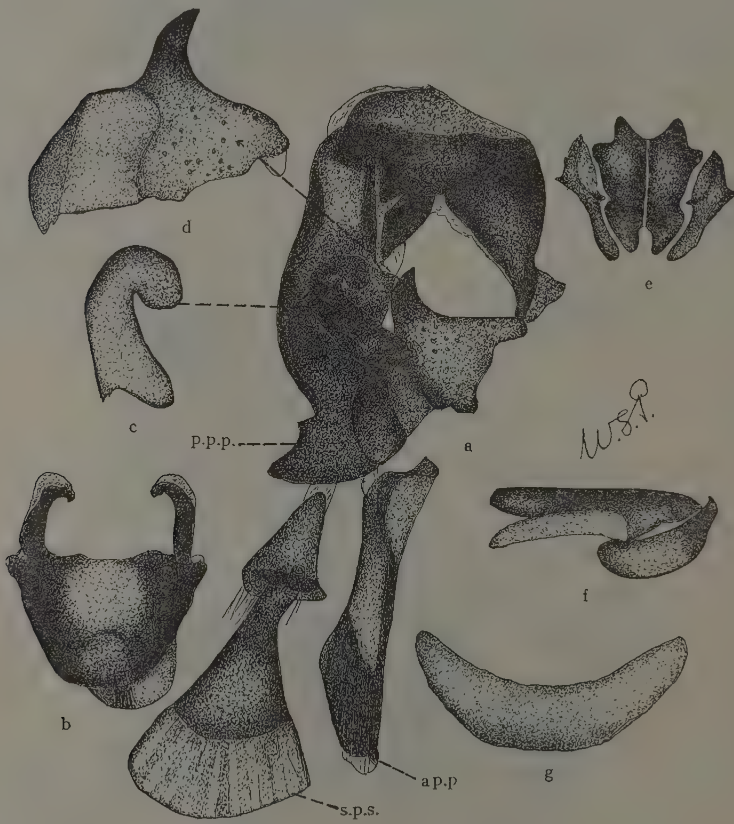

Fig. 15. — *a*. Phallosome and one paramere of *Pseudosarcophaga affinis* in side view; *b*. Ninth tergo-sternum; *c*. Posterior paramere; *d*. Anterior paramere; *e*. Ventral view of anal cerci and ninth coxites; *f*. Anal cercus and distal segment of ninth coxite in side view; *g*. Fifth sternum (fore-shortened).

Wohlfahrtia and *Agria;* the illustration (Fig. 15g) does not show its characteristic shape. Ninth tergo-sternum (Fig. 15b) wide with long posterior arms. Distal segment of ninth coxite (Fig. 15e, f) structurally similar to that of *Wohlfahrtia*, long and turned inwards and ending in a blunt point; proximal segment wanting. Each anal cercus (Fig. 15e, f) with short anterior free end terminating in a point when seen in lateral view; posterior part attached to fellow (Fig. 15e) is long and wide. Phallosome (Fig. 15a) distal end bent dorsally and consisting of two large flat plates on each side forming a trough and uniting at the distal end in a blunt point with a raised crest-like projection in the middle; the body of the phallosome is long and wide and the posterior process is short and wide; the apodeme is short and the sperm pump sclerite large. The anterior paramere (Fig. 15a) is wide ending in a short bluntly pointed process; the posterior part (Fig. 15a, c) is also short and wide the broad end bent. I have not been able to study the ♀ terminalia. This Palaearctic species though belonging to the same group as does *Wohlfahrtia* and *Agria* is undoubtedly generically distinct.

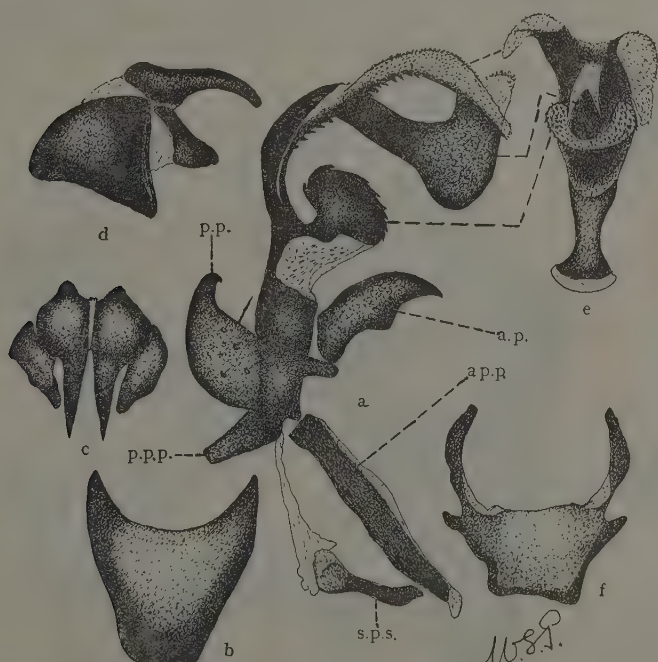

Fig. 16. — *a*. Phallosome and paramere of *Nyctia halterata* in side view; lettering as in Fig. 2*a*; *b*. Fifth sternum; *c*. Ventral view of anal cerci and ninth coxites; *d*. Lateral view of tenth tergum and anal cercus and distal segment of ninth coxite; *e*. Dorsal view of end of phallosome; *f*. Ninth tergo-sternum.

Nyctia halterata Panzer

Male Terminalia (Fig. 16): In this species also there is no loose membrane between segments 5 and 7 of the abdomen and sternum 5 (Fig. 16b) is structurally similar to that of *Wohlfahrtia* and *Agria*. The ninth tergosternum (Fig. 16f) is short and wide the posterior arms long. The distal segment of the ninth coxite (Fig. 16d) resembles that of *Wohlfahrtia* and is attached in the same way to tergum 10, the dorsal free end turning inwards; the proximal segment is wanting. Each anal cercus (Fig. 16d) is a short rounded plate more than half the anterior end free and terminating in a blunt point; the posterior part (Fig. 16c) is fused to its fellow and is wide. The phallosome (Fig. 16a) is characteristic consisting of a long bent median process shaped at the end like the bowl of a pipe the wide ejaculatory duct opening at the top of the bowl; on each side there is a long, spined semimembranous process; nearer the base on the dorsal side there is a characteristic median round chitinous lobe (a process in side view) armed with strong spines (seen as if along its edge in side view) extending across the middle of the phallosome (Fig. 16a, e). The body of the phallosome is relatively long, the posterior process blunt and short; the apodeme is long and

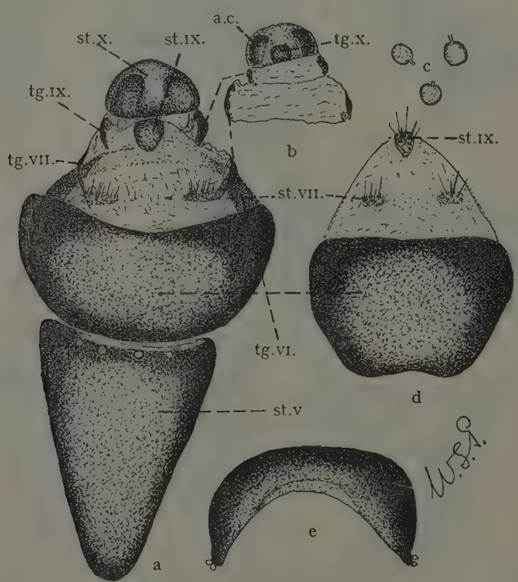

Fig. 17. — *a*. Ventral view of extended larvipositor of *Nyctia halterata;* lettering as in Fig. *3a; b*. Dorsal view of end of larvipositor; lettering as in Fig. *3c*; *c*. Spermathecae; *d*. Sixth, seventh and ninth sterna; *e*. Sixth sternum.

wide and the sperm pump sclerite is small. The anterior paramere (Fig. 16a) is a short plate ending in a sharp bent point; the posterior part (Fig. 16a) is a broad upstanding plate the end narrowing into a blunt hook; it has one short hair and several sensory ones.

Female Terminalia (Fig. 17): Tergum 6 (Fig. 17e) is a short wide undivided plate, and sternum 6 (Fig. 17a, d) is a long wide convex plate like that of the species of *Wohlfahrtia*. Tergum 7 (Fig. 17a) is only chitinised at the sides, and sternum 7 (Fig. 17a, d) consists of two small hairy chitinised plates on each side of the middle line. Tergum 9 (Fig. 17a) like tergum 7 is only chitinised at the sides, while sternum 9 (Fig. 17a) consists of a small heart-shaped median plate. Tergum 10 (Fig. 17b) is a small plate, while sternum 10 (Fig. 17a) is a triangular-shaped plate. The anal cerci are small as are the spermathecae.

Nyctia halterata is a common shining black species and on its terminalic characters belongs to the same group as does *Wohlfahrtia* and *Agria* possessing the same group characters; the large sixth sternum of the ♀ terminalia is characteristic. It is clearly generically distinct; at present I do not know its exact relationships within the group.

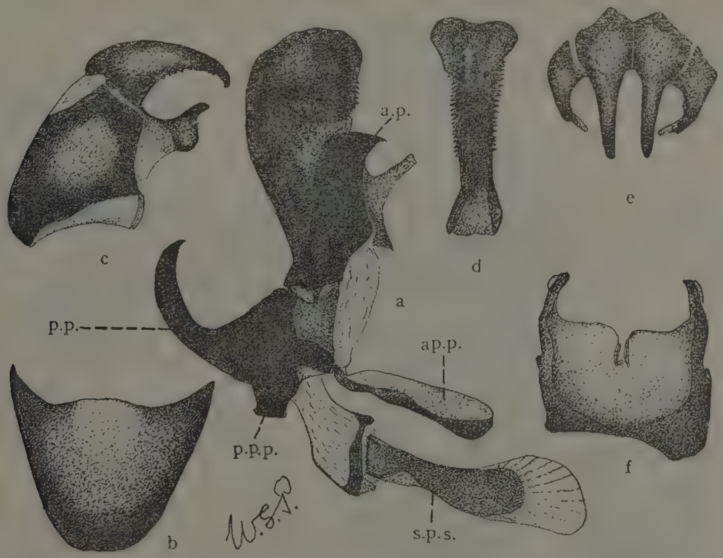

Fig. 18 — *a.* Phallosome and paramere of *Brachycoma devia* in side view; lettering as in Fig. *2a; b.* Fifth sternum; *c.* Tenth tergum, anal cercus and distal segment of ninth coxite in side view; *d.* Dorsal view of end of phallosome; *e.* Ventral view of anal cerci and distal segments of ninth coxites; *f.* Ninth tergo-sternum.

Brachycoma devia Fallen

Male Terminalia (Fig. 18) : In this species also there is no loose membrane between segments 5 and 7 of the abdomen and sternum 5 (Fig. 18b) is similar to that of *Wohlfahrtia*, etc. The ninth tergo-sternum (Fig. 18f) is short and wide. The distal segment of the ninth coxite (Fig. 18c) is similarly attached to the anterior border of tergum 10, is a rounded plate ending in an inwardly directed finger-like process ; the proximal segment is wanting. Each anal cercus (Fig. 18c) is a short bent plate terminating in a blunt hooked point ; the anterior three-quarters is free, the posterior part which is joined to its fellow is wide (Fig. 18e). The phallosome (Fig. 18a) is short and rounded distally ending in two processes spined at their ends and nearly meeting in the middle line dorsally ; the phallosome is hollowed out dorsally the sides edged with a row of short spines (Fig. 18d) ; the proximal part or body of the phallosome is short ; the posterior process is short (Fig. 18a) and wide and the apodeme is also short ; the sperm pump sclerite (Fig. 18a) is large. The anterior paramere (Fig. 18a) is a short wide plate ending in a sharp point when seen in lateral view ; the posterior part is a long bent plate also terminating in a sharp point ; it has no hairs on it.

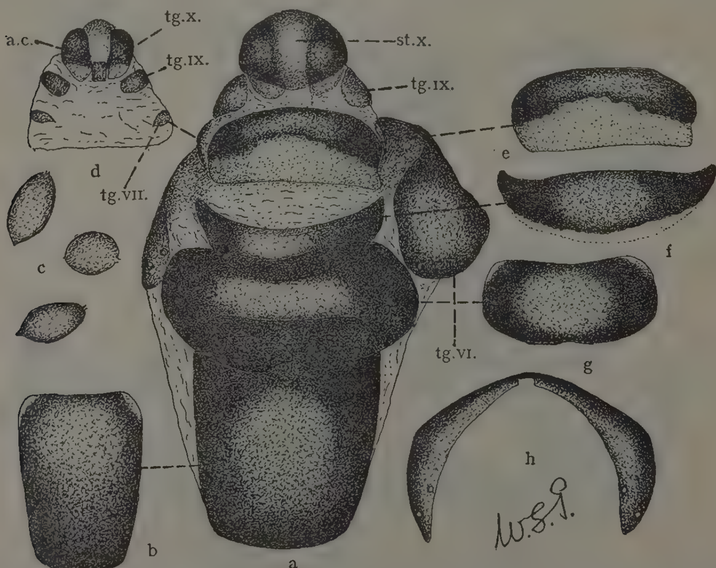

Fig. 19. — *a*. Ventral view of extended larvipositor of *Brachycoma devia*; lettering as in Fig. *3a*; *b*. Fifth sternum; *c*. Spermathecae; *d*. Dorsal view of end of larvipositor; lettering as in Fig. *3c*; *e*. Ninth sternum; *f*. Seventh sternum; *g*. Sixth sternum; *h*. Sixth tergum.

Female Terminalia (Fig. 19): Tergum 6 (Fig. 19h) is undivided; sternum 6 (Fig. 19a, g) is a long wide plate. Terga 7 and 9 each consist of small round chitinised plates at the sides (Fig. 19a, d); sternum 7 (Fig. 19a, b) is a short wide plate, while sternum 9 (Fig. 19a, e) is a long wide plate more strongly chitinised on its anterior half. Tergum 10 (Fig. 19d) is a small rectangular plate; sternum 10 (Fig. 19a) is a large round plate. The anal cerci (Fig. 19d) are long wide plates, and the spermathecae (Fig. 19c) are elongated.

Tribe SARCOPHAGINI

This large group of the subfamily Sarcophaginae is exemplified by the species of *Sarcophaga* and allies. In this tribe the fifth segment of the abdomen is attached to the seventh by a loose membrane so that the seventh and following segments can be drawn apart from the rest of the abdomen. Sternum 5 (Fig. 20) is in the main a forked plate either with long or short lobes the inner sides of which as well as the ends are armed with strong hairs, or stiff brush-like ones often bent hook-like at their ends. The distal segment of the ninth coxite unlike that of the species of the tribe Agrini is a plate of varying size situated close between the outer side of the anal cercus and the anterior border of the tenth tergum, and is not capable of functioning as a lateral clasper. The proximal segment is in the majority wanting; on one or two species so far examined (*Sarcophaga striata* for instance) it is represented by a hort slender rod. In this connection I would like to point out that Dr. Rhodendorf has suggested to me that the structure which I described in an earlier paper (1934) as the eighth spiracle is the remains of the proximal segment of the ninth coxite. From what I have seen of this structure since then I am inclined to think that Dr. Rhodendorf is right. The phallosome in the Sarcophagini is a complicated structure with many accessory processes which I have referred to as "gadgets"; I am quite enable to explain their real significance; there is certainly nothing particular in the structure of the ♀ terminalia to explain them. The posterior process of the phallosome is usually short or entirely wanting. The apodeme varies also in length and width and the sperm pump sclerite is generally large. The ninth tergo-sternum also varies in size and shape. The parameres are as a rule of very uniform structure. The anterior is generally a long plate convex externally with hairs along the lower border often in a row; it may either be pointed and hooked at the end, or the end may be blunt and rounded. The posterior part is usually an upstanding plate with a hooked pointed end with several long and short hairs just near the end on the upper border.

Female Terminalia: The ♀ terminalia too are very similar in the species of the tribe so far examined. I have redrawn the ♀ terminalia of *Sarcophaga carnaria* (Fig. 21) as my first drawing in an earlier paper

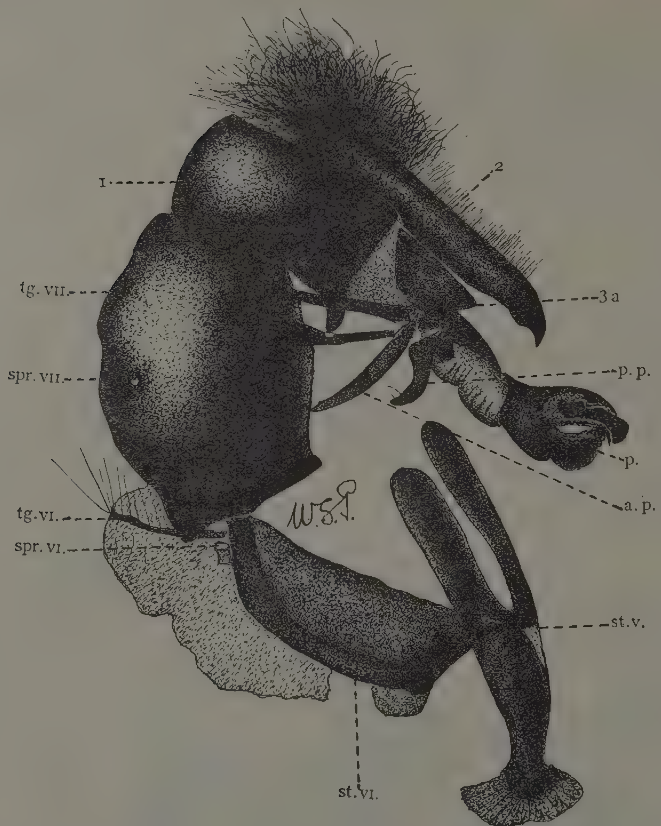

Fig. 20. — *a.* Seventh and tenth terga, anal cercus, distal segment of ninth coxite, phallosome, sixth and fifth sterna of *Sarcophaga carnaria* showing the membrane between segments 5 and 7 which is characteristic of the tribe Sarcophagini; lettering as in Fig. 1.

(1934) was the first terminalia of this type I depicted and though quite accurate are not satisfactory. A reference to the illustration of the ♀ terminalia of *carnaria* (Fig. 21) and the many others of the British species since depicted, it will be noted that the larvipositor is very short. Tergum 6 may or may not be divided into two separate plates. Sterna 6 and 7 are always well developed and afford good diagnostic characters. Sternum 9 appears to be represented either by a distinct plate usually closely attached to the distal end of sternum 7, and in some species (*dissimilis, haemorrhoea*) bent so that

it is concave ventrally and convex dorsally ; the plate varies in size and shape and affords a valuable diagnostic character ; or it may be represented by a large membranous area which not only projects beyond the end of sternum 7 but surrounds its sides and is distinct from the ordinary inter-segmental membrane ; it generally bears at the end in the middle many small hairs ; it may be forked at the end (*falculata*) and there may be a small chitinous plate in the middle. A reference to the illustrations of the ♀ terminalia of the British species of *Sarcophaga* will leave no doubt that the shape and structure of sterna 6, 7 and 9 afford reliable characters for their identification. Tergum 7 is always incompletely developed and terga 9 and 10 may or may not be present. Sternum 10 is always present and varies in shape and size. In many species it has attached to its ventral edge a strong plate which then forms a support to the dorsal wall of the wide genital opening. The presence or

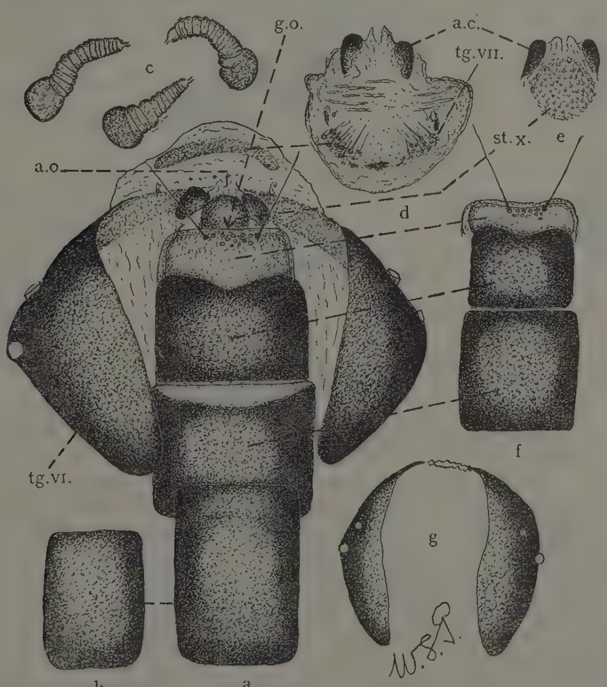

Fig. 21. — *a*. Ventral view of extended larvipositor of *Sarcophaga carnaria*; *a.o.* Anal opening; *g.o.* Genital opening; *st.x.* Tenth sternum; *tg.vi.* Sixth sternum; *b.* Fifth sternum; *c.* Spermathecae; *d.* Membranous area between the sixth stergum and anal cerci to show the seventh tergum; *a.c.* Anal cerci; *tg.vii.* Seventh tergum; *e.* Tenth sternum and anal cerci; *f.* Sixth, seventh and ninth sterna; *g.* Sixth tergum showing its dividison into two parts.

absence of this accessory plate, and its shape when present, affords a valuable subsidiary diagnostic character. The anal cerci do not provide any useful diagnostic characters. The signum may or may not be present, and when present varies markedly in size and shape in the different species affording a good diagnostic character; it can only be seen in a caustic potash specimen of the dissected terminalia. The spermathecae are sometimes characteristic, and they also can only be studied in caustic potash preparations.

In *Sarcophaga carnaria* (Fig. 21) it will be noted that tergum 6 is divided into two plates; sternum 9 consists of a semi-membranous plate with a group of hairs at the anterior border and some scattered ones, and one long one on each side. Tergum 7 is variable in structure and may consist of isolated chitinised areas with a patch of 9-12 small hairs; or it may be more strongly chitinised and extending round as an arched plate. There is a small chitinised area on each side close to the tergum which I referred to as spiracle 8 in an earlier paper (1934); I may be wrong in my interpretation of it. Terga 9 and 10 are wanting and sternum 10 is a star-shaped lightly chitinised plate; there is no accessory plate attached to it. The signum is wanting; the spermathecae are long, flask-like bodies, the neck long and crenulated appearing to consist of several rings forming a channel.

Keeping these ♂ and ♀ terminalic characters in mind it should be relatively easy to decide whether a given species belongs to the tribe Agrini, or the tribe Sarcophagini. I have selected *Leucomyia cinerea* F. (*Sarcophila alba* Schr.), a common fly along the sea front at Colombo, Ceylon, where it may be seen sitting on organic refuse, to test these characters.

Leucomyia cinerea F.

Male Terminalia (Fig. 22): A loose membrane between segments 5 and 7 of abdomen as in *Sarcophaga*. Sternum 5 (Fig. 22f) forked with long lateral lobes armed on their inner surfaces with numerous hairs. Ninth tergosternum (Fig. 22b) large with long posterior processes. Distal segment of ninth coxite (Fig. 22d) narrow elongated plate located as in *Sarcophaga;* the proximal segment wanting. Each anal cercus (Fig. 22d) is a long wide plate, the short anterior free end bend upwards terminating in a long deeply pigmented pointed beak; the longer wide posterior end is joined to its fellow (Fig. 22c). The phallosome (Fig. 22a) is long and the distal end wide, the ventral convex surface is narrow and bears two slender barred processes which project dorsally at the end; the dorsal surface bears a pair of strongly chitinised bent rods which cross each other, and when seen from the dorsal surface (Fig. 22e) have each two strong tooth-like processes. The proximal part of the phallosome is long and narrow, and at the junction of the two parts dorsally the membrane is folded and projects as a lobe armed with short dark spines. The

posterior process is short; the apodeme is also short and the sperm pump sclerite is small. The two parts of the paramere (Fig. 22a) are very *Sarcophaga*-like, the anterior is a long and bent plate expanded at the end, and the posterior a narrower plate with a row of sensory hairs along the dorsal edge; there is a long supporting sclerite.

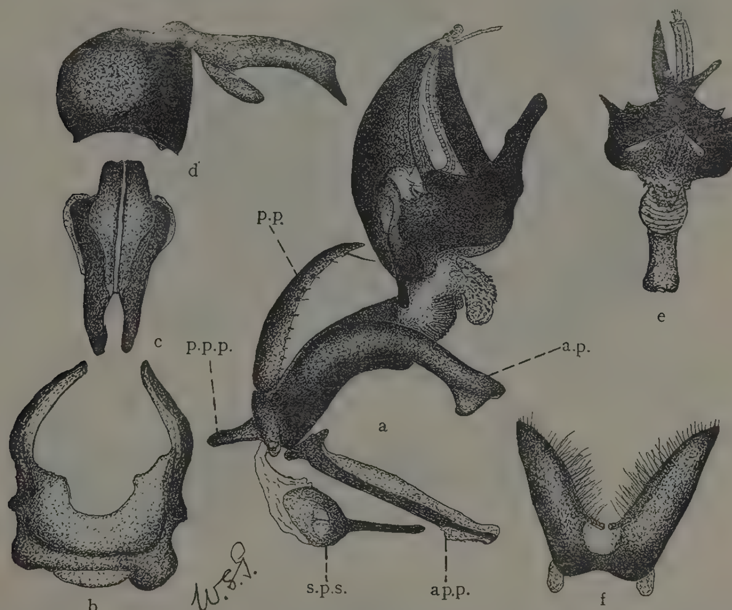

Fig. 22. — *a.* Phallosome and paramere of *Leucomyia cinerea* in side view· lettering as in Fig. *2a; b.* Ninth tergo-sternum; *c.* Ventral view of anal cerci and distal segments of ninth coxites; *d.* Tenth tergum, anal cerci and distal segment of ninth coxite in side view; *e.* Dorsal view of end of phallosome; *f.* Fifth sternum.

Female Terminalia (Fig. 23): The larvipositor is very short and as the parts are fully illustrated it is only necessary to draw attention to one or wo particular characters. Tergum 6 (Fig. 23b) is undivided. Tergum 10 (Fig. 23e, h) appears to be represented by a long narrow ribbon-like plate somewhat like that in *Wohlfahrtia*. Sternum 10 (Fig. 23g, h) has a small rectangular accessory plate attached to it, and the signum is large and well chitinised and shaped as shown in the illustration (Fig. 23f). Taking these ♂ and ♀ terminalic characters into consideration I think there is no doubt that this species belongs to the Tribe Sarcophagini.

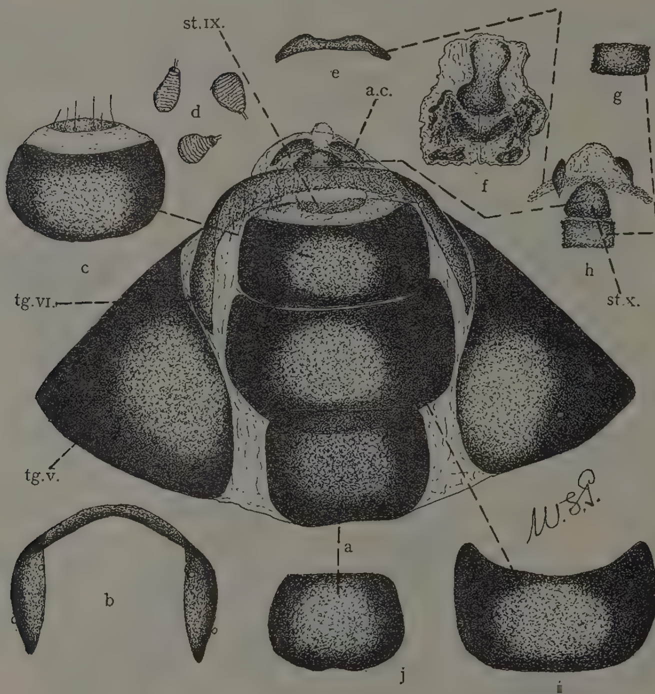

Fig. 23. — *a.* Ventral view of extended larvipositor of *Leucomyia cinerea;* lettering as in Fig. *3a; b.* Sixth tergum; *c.* Ninth sternum; *d.* Spermathecae; *e.* Tenth tergum; *f.* Signum; *g.* Accessory plate attached to the tenth sternum; *h.* Tenth sternum, accessory plate and anal cerci; *i.* Sixth sternum; *j.* Fifth sternum.

SUBFAMILY MILTOGRAMMATINAE

I now come to the consideration of the terminalia of some species of this large group of larviparous flies. As is well known they are closely associated with the nests of the fossorial Hymenoptera ; they are not true parasites as their larvae feed on the food (paralysed caterpillars, etc.) provided by the wasps for their young. This group of flies are usually either placed in the subfamily Sarcophaginae, or very close to it. Through the generosity of Mr. Colbran J. Wainwright I have been able to examine the terminalia of several British species. I shall only note the salient diagnostic characters of the terminalia not going into any detail as the drawings speak for themselves.

Miltogramma punctata Meigen

Male Terminalia (Figs. 24, 25): No loose membrane between segments 5 and 7 of abdomen (Fig. 24). Sternum 5 is not markedly forked, the lateral lobes are short as shown in Fig. 25b. Tergum 7 is well developed. The ninth tergo-sternum (Fig. 25e) is like that of many other higher Diptera the Calliphorinae in particular. The proximal segment of the ninth coxite is present (Fig. 25c) and consists of a short bent rod or plate, and is attached to the postero-lateral aspect of the distal segment, and by its other end to the posterior process of the ninth tergo-sternum. The distal segment (Figs. 24, 25c, d) is a long plate, the free end narrow, bluntly rounded and bent in towards its fellow forming a good lateral clasper. Each anal cercus (Figs. 24, 25c) is a long plate about the anterior three-quarters free and ending in a blunt point; the posterior part is wide and is fused with its fellow (Fig. 25d). The phallosome (Fig. 25a) is long particularly the distal part which has a strong ventral rod-like chitinous strut from which a chitinous bar extends upwards on each side; the dorsal membranous part is thickly beset by a long row of stout pointed appressed spines; the proximal part is short and wide and is joined to the distal part by membrane. The posterior part of the phallosome is a long rounded stout rod slightly bent at the blunt end; the apodeme is long and stout; the sperm pump sclerite is small.

Female Terminalia (Fig. 26): Larvipositor long. Sternum 5 (Fig. 26b) is very long. Tergum 6 (Fig. 26j) is undivided. Tergum 7 (Fig. 26i) is a complete narrow plate, and tergum 9 (Fig. 26a) consists of somewhat oval

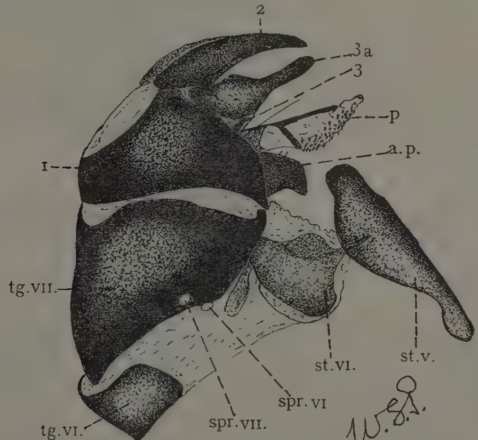

Fig. 24. — *a.* Sixth, seventh and tenth terga, anal cercus, ninth coxite, phallosome, sixth and fifth sterna of *Miltogramma punctata* in side view; lettering as in Fig.1.

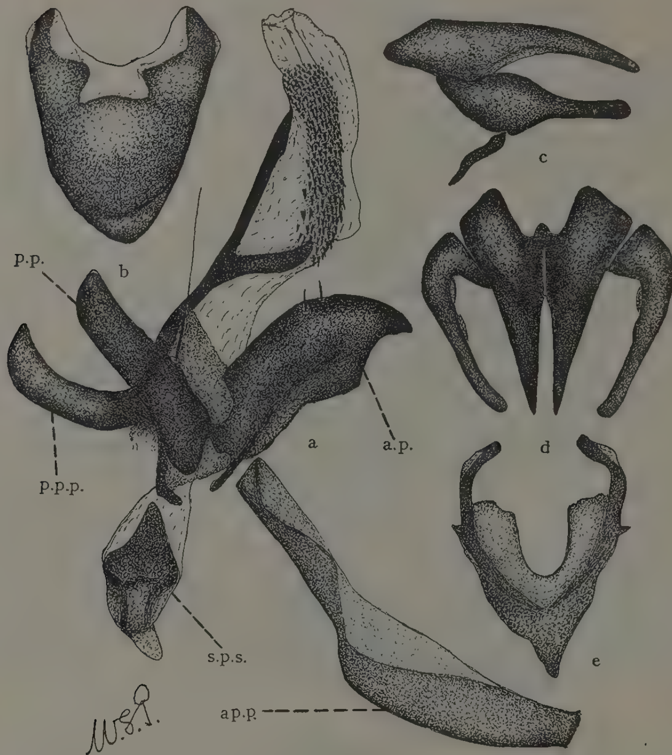

Fig. 25. — *a.* Phallosome and paramere of *Miltogramma punctata* in side view; lettering as in Fig. 2*a*; *b.* Fifth sternum; *c.* Anal cercus and ninth coxite in side view; *d.* Ventral view of anal cerci and distal segments of ninth coxites; *e.* Ninth tergo-sternum.

convex plates at sides. Sterna 6, 7 ad 9 are well developed. Tergum 10 is a large somewhat triangular-shaped plate and sternum 10 a large rounded plate. The signum is wanting; two spermathecae are long and one short.

Miltogramma germari Meigen

Male Terminalia (Fig. 27): No loose membrane between segments 5 and 7 of abdomen. Sternum 5 (Fig. 27c) somewhat similar to that of *Miltogramma punctata* but with a tooth-like process on inner side of each short lobe. Ninth tergo-sternum (Fig. 27b) somewhat like that of *Miltogramma punctata*. Proximal segment of ninth coxite (Fig. 27d) is a short wide plate:

the distal segment (Fig. 27d) is a broad plate (in side view), the free end wide, round and bent inwards. Each anal cercus (Fig. 27d) is slightly longer than that of *Miltogramma punctata* otherwise the two cerci are very similar. The phallosome (Fig. 27a) as will be noted by the illustration is very similar to that of *Miltogramma punctata* only differing in that the chitinous bar at the base of the distal end is longer, the dorsal membranous part is wider and bears fewer spines. The posterior process (Fig. 27a) also is very similar. The anterior paramere (Fig. 27a) is shorter than that of *Miltogramma punctata* with a shorter bent point at the free end, and usually with only one short, stout hair; the posterior part (Fig. 27a) is wider and ends in a more pronounced point; it also has a short hair.

Female Terminalia (Fig. 28): The larvipositor is long and structurally similar to that of *Miltogramma punctata* the main differences being in the shape of the sterna. Terga 6 and 7 (Fig. 28g) are complete, the latter fused to the former as shown in the illustration.

It will be noted from a comparison of the illustrations of the terminalia

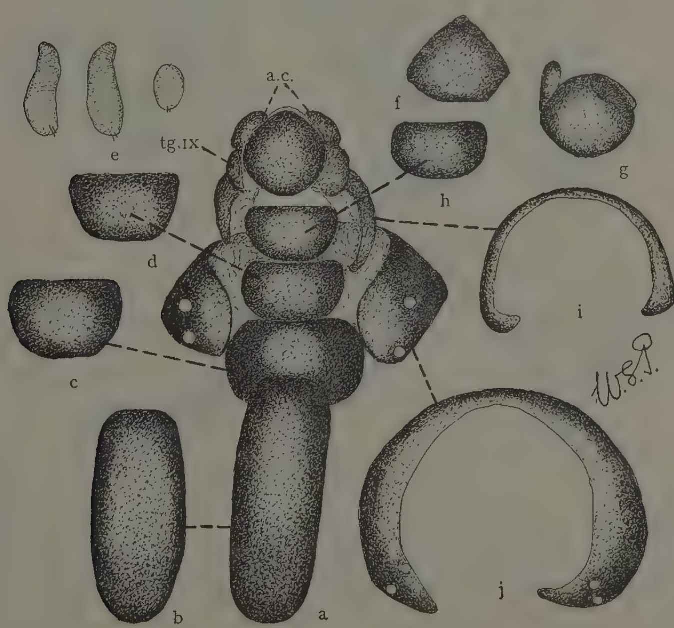

Fig. 26. — *a.* Ventral view of extended larvipositor of *Miltogramma punctata*; lettering as in Fig. *3a; b.* Fifth sternum; *c.* Sixth sternum; *d.* Seventh sternum; *e.* Spermathecae; *f.* Tenth tergum; *g.* Tenth sternum and anal cerci; *h.* Ninth sternum; *i.* Seventh tergum; *j.* Sixth tergum.

of these two species that they are very closely related and undoubtedly belong to the same genus. Both are common and widely distributed Palaearctic species.

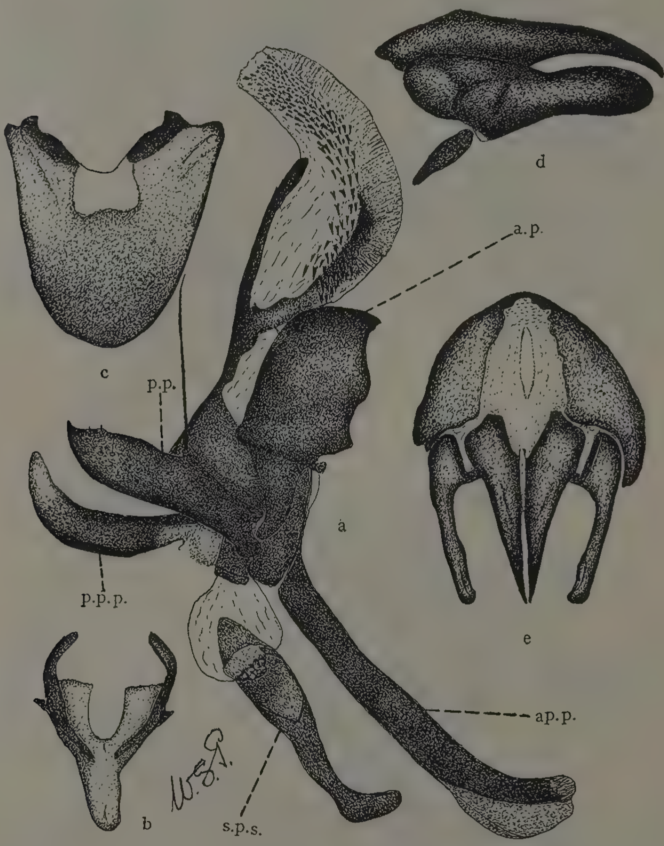

Fig. 27. — *a.* Phallosome and paramere of *Miltogramma germani* in side view; lettering as in Fig. 2*a*; *b.* Ninth tergo-sternum; *c.* Fifth sternum; *d.* Anal cercus and two parts of ninth coxite in side view; *e.* Ventral view of tenth tergum, anal cerci and distal segments of ninth coxites.

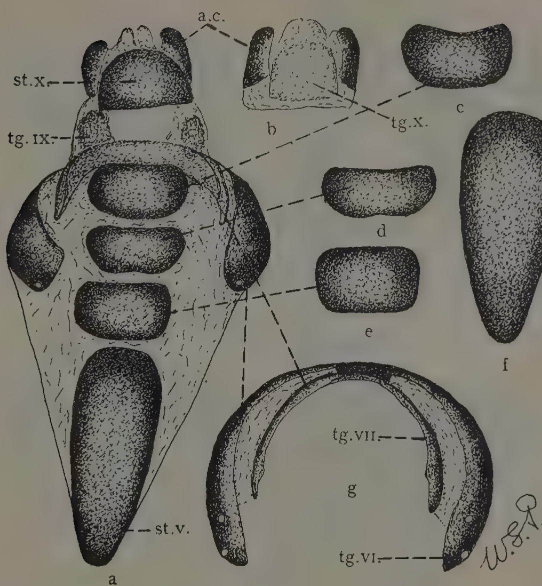

Fig. 28. — *a.* Ventral view of extended larvipositor of *Miltogramma germari*; lettering as in Fig. *3c; b.* Dorsal view of end of larvipositor; *c.* Ninth sternum *d.* Seventh sternum; *e.* Sixth sternum; *f.* Fifth sternum; *g.* Sixth and seventh terga.

Metopia leucocephala Rossi

Male Terminalia (Fig. 29) : No loose membrane between segments 5 and 7 of abdomen. Tergum 6 is well developed. Sternum 5 (Fig. 29b) and the ninth tergo-sternum (Fig. 29c) similar to those of the two *Miltogramma* noted above. The ninth coxite (Fig. 29d) and anal cercus are also structurally similar, the distal segment of the former ending in a narrow finger-like process. The phallosome (Fig. 29a) too is structurally similar only differing in minor details. The end of the chitinous bar is rounded and the end of the ventral strut is expanded. The anterior paramere (Fig. 29a) is more sharply pointed; the posterior part of the paramere (Fig. 29a) is very similar to that of *Miltogramma punctata*.

Female Terminalia (Fig. 30) : The larvipositor is long and structurally similar to that of *Miltogramma punctata* and *Miltogramma germari;* the differences will be noted on comparing the shape of the various sclerites. *Metopia leucocephala* in a common Palaearctic species and is found about sand dunes. I am not in a position to decide whether the genus *Metopia* is really distinct from *Miltogramma* without examining the terminalia of more of the species.

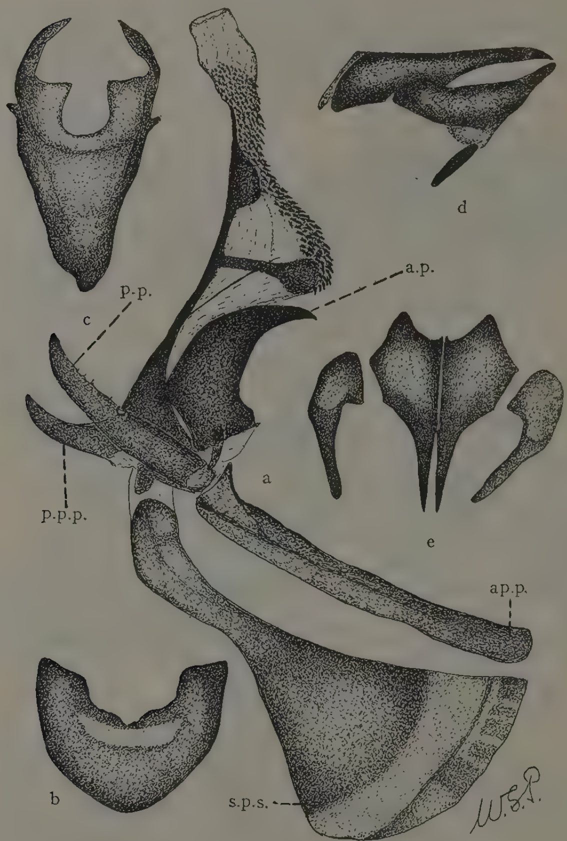

Fig. 29. — *a.* Phallosome and paramere of *Metopia leucocephala* in side view; lettering as in Fig. 2*a;* *b.* Fifth sternum; *c.* Ninth tergo-sternum; *d.* Anal cercus and two parts of ninth coxite in side view; *e.* Ventral view of anal cerci and distal segments of ninth coxites.

Sphecapata conica Fallen

Male Terminalia (Fig. 31) : Here again there is no loose membrane between segments 5 and 7 of abdomen and tergum 6 is well developed. Tergum 5 (Fig. 31e) has rounded lobes very suggestive of that of the Calliphorinae. The distal segment of the ninth coxite (Fig. 31b) is short ending in a short finger-like process. Each anal cercus (Fig. 31b) is short, broad and bent upwards into a point. The phallosome (Fig. 31a) is relatively short especially the distal part ; the chitinous bar is wide and is supported at the

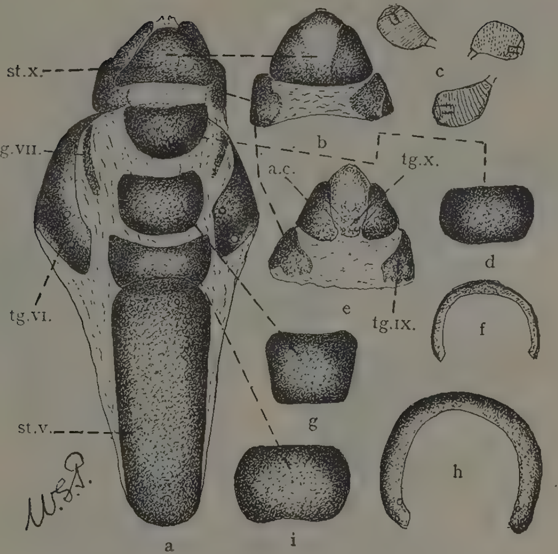

Fig. 30. — *a.* Ventral view of extended larvipositor of *Metopia leucocephala;* lettering as in Fig. *3a; b.* Ventral view of end of larvipositor; *c.* Spermathecae; *d.* Ninth sternum; *e.* Dorsal view of end of larvipositor; lettering as in Fig. *3c; f.* Seventh tergum; *g.* Seventh sternum; *h.* Sixth tergum; *i.* Sixth sternum.

side by a pointed chitinous plate ; there is also a chitinous support at the membrnaous end of the phallosome. The posterior process (Fig. 31a) is short. The two parts of the paramere are like those of the other species noted above ; the posterior part has a raised area bearing a long stout hair.

Female Terminalia (Fig. 32) : The larvipositor is long and structurally similar to that of the species noted above there being only minor differences in the shape of the various sclerites. It is interesting to note that spiracle 7 is located on tergum 7 which together with tergum 9 is well developed.

This is another common Palaearctic species and is associated with the Aculeate Hymenoptera. The genus is clearly distinct but closely related to *Miltogramma.*

The comparative study of the terminalia of these species of the genera *Miltogramma, Metopia* and *Sphecapata* leave little doubt that they are closely allied and would with other genera best be placed in the Tribe Miltogrammatini of the Subfamily Miltogrammatinae. It is also I think clear that this subfamily is not related to the Sarcophaginae (tribes Sarcophagini and Agrini). The absence of a loose membrane between segments 5 and 7 of the abdomen at once separates them from the species of the

tribe Sarcophagini (*Sarcophaga* and allies). The proximal segment of the ninth coxite is well developed and functional and the distal segment well developed and forms a lateral clasper, these characters distinguishing them

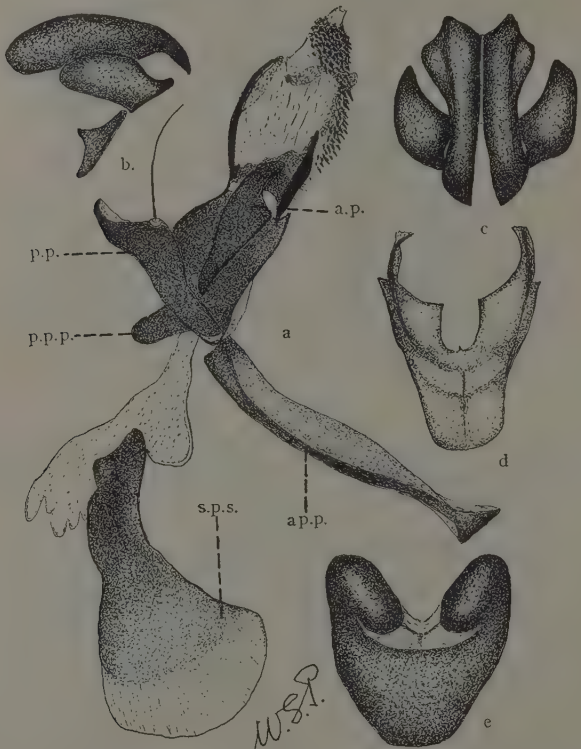

Fig. 31. — *a*. Phallosome and paramere of *Sphecapata conica* in side view; lettering as in Fig. *2a*; *b*. Anal cercus and two parts of ninth coxite in side view; *c*. Ventral view of anal cerci and distal segments of ninth coxites; *d*. Ninth tergosternum; *e*. Fifth sternum.

from the species of the tribe Agrini (*Agria* and allies). The phallosome too is quite unlike that of the Sarcophaginae, the posterior process being well developed in *Miltogramma* and *Metopia*. The female terminalia too are quite distinct from those of the Sarcophaginae in spite of the fact that most of the species are larviparous; the terga and sterna are much better developed especially those of segments 7 and 9. The terminalia of the Miltogrammatinae suggest relationships with those of the Calliphorinae the final decision

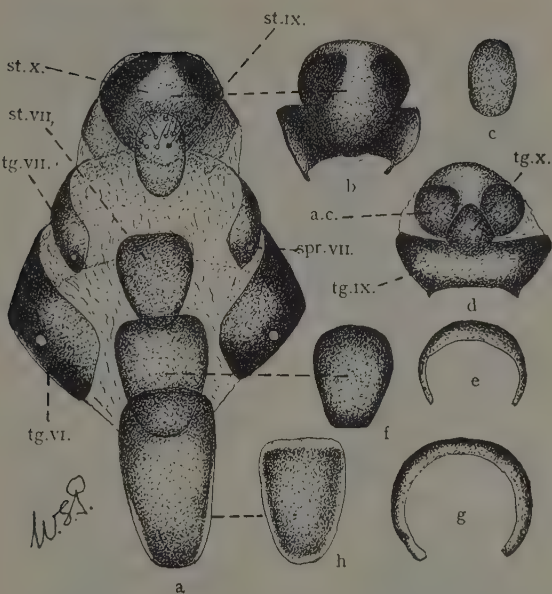

Fig. 32. — *a.* Ventral view of extended larviposítor of *Sphecapata conica*; lettering as in Fig. *3a; b.* Venral view of end of larviposítor; *c.* Ninth sternum; *d.* Dorsal view of end of larviposítor; lettering as in Fig. *3c; e.* Seventh tergum; *f.* Sixth sternum; *g.* Sixth tergum; *h.* Fifth sternum.

as to their exact position cannot as yet be made until the terminalia of the Rhinines have been studied.

Lastly I have studied the terminalia of another Palaearctic species *Helicobosca muscaria* Mg., and its close ally *Helicobosca distinguenda* Vill. These two species were confused and not regarded as distinct until Dr. Villeneuve pointed out that in *Helicobosca muscaria* the vertex of the ♂ is almost as wide as in the ♀, whereas in *Helicobosca distinguenda* the vertex of the ♂ is narrow. These two species are usually placed in the tribe Agrini but a reference to the accompanying notes and illustrations will I think show that they do not belong here.

Helicobosca muscaria Meigen

Male Terminalia (Fig. 33) : Tergum 6 is well developed. Sternum 5 (Fig. 33b) is very like that of the Calliphorinae. The proximal and distal segments of the ninth coxite (Fig. 33d) are well developed, the latter a long wide round plate. Each anal cercus (Fig. 33d) is a long plate ending in a point. The phallosome (Fig. 33a) is short and stout, the distal part consisting

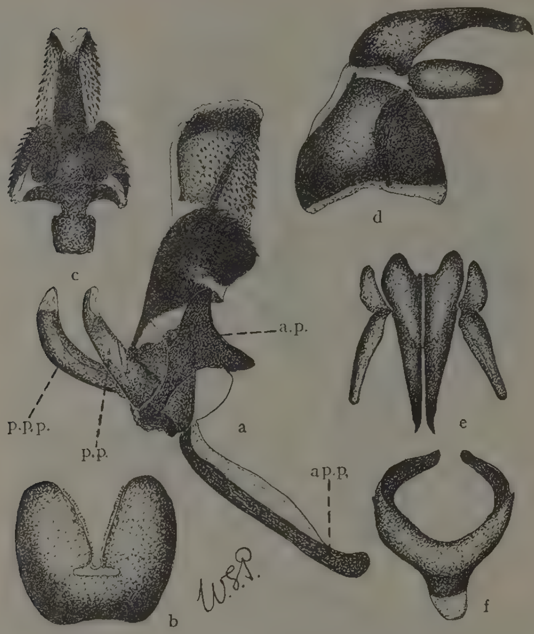

Fig. 33. — *a.* Phallosome and paramere of *Helicobosca muscaria* in side view; lettering as in Fig. *2a*; *b.* Fifth sternum; *c.* Dorsal view of end of phallosome; *d.* Tenth tergum, anal cercus and two parts of ninth coxite in side view; *e.* Ventral view of anal cerci and distal segments of ninth coxites; *f.* Ninth tergo-sternum.

of two basal chitinous parts one wide and round, and edged with spines, the other shorter and ending in a point; the end portion is semi-membranous, wide and is covered with many short appressed pointed spines; the posterior process (Fig. 33a) is long and curved. The anterior paramere (Fig. 33a) has a long ventral prolongation and ends in a short, upraised bluntly pointed part; it has one rather short hair; the posterior part of the paramere (Fig. 33a) is a short rounded rod with several sensory hairs and a membranous blunt end.

Helicobosca distinguenda Villeneuve

Male Terminalia (Fig. 34): The terminalia are very similar to those of *Helicobosca muscaria* as will be seen by comparing the illustrations of the various parts. The following differences may be noted: The distal segment of the ninth coxite of *Helicobosca distinguenda* is about half the

length of that of *Helicobosca muscaria*, and the anal cercus is wider at the end when seen in side view, and the pointed end is longer; but in order to note these differences it would be necessary to compare the two together. The anterior paramere (Fig. 34a) is wider and rounder at the end.

Female Terminalia (Fig. 35) : The larvipositor of *Helicobosca muscaria* is illustrated in Fig. 35a; that of *Helicobosca distinguenda* is very similar. Here again the differences are small and are to be noted in the size and shape of terga 9 and 10 and sternum 7.

These two species then though very closely related are undoubtedly distinct. They well exemplify a case in which two species can only be separated on the width of the vertex of the male and other minor characters and in which the terminalia are very similar. Another good example is *Musca domestica* and *Musca vicina*. It is not possible at present to be certain of the systematic position of *Helicobosca muscaria* and *Helicobosca distinguenda*, one point, however, is certain they do not belong to the subfamily Sarcophaginae; the terminalia suggest relationships with the Calliphorinae.

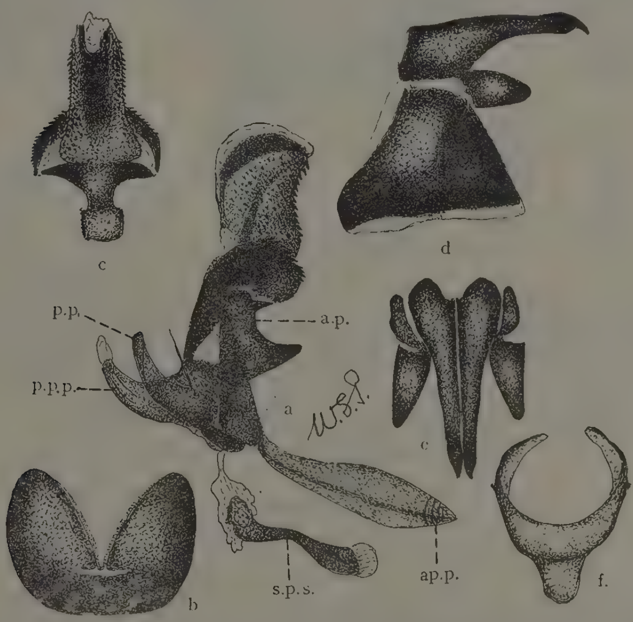

Fig. 34. — *a*. Phallosome and paramere of *Helicobosca distinguenda* in side view; *b*. Fifth sternum; *c*. Dorsal view of end of phallosome; *d*. Tenth tergum, anal cercus and two parts of ninth coxite in side view; *e*. Ventral view of anal cerci and distal segments of ninth coxites; *f*. Ninth tergo-sternum.

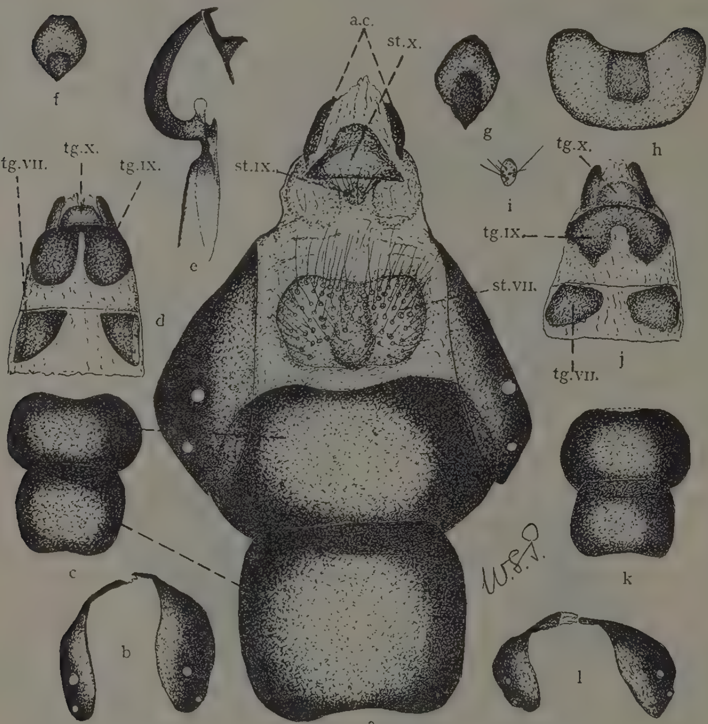

Fig. 35. — *a*. Ventral view of extended larviipositor of *Helicobosca muscaria*; *b*. Sixth tergum of same; *c*. Fifth and sixth sterna of same; *d*. Dorsal view of end of larvipositor of same; lettering as in Fig. *3c*; *e*. Cephalopharyngeal skeleton of first stage larva of same; *f*. Tenth tergum of same; *g*. Tenth tergum of *Helicobosca distinguenda*; *h*. Seventh sternum of same; *i*. Ninth sternum of same; *j*. Dorsal view of end of larvipositor of same; lettering as in Fig. *3c*; *k*. Fifth and sixth sterna of same; *l*. Sixth tergum of same.

Summary

1. The technique employed in the study of the terminalia of the higher Diptera is given.

2. The terminalia of five species of *Wohlfahrtia* are noted and illustrated, and the terminalia characters of the genus are given.

3. The terminalia characters of the two tribes, the Agrini and the Sarcophagini of the subfamily Sarcophaginae are noted.

4. It is shown how by the study of the terminalia of the species of

different genera it is possible to place them in one or other of these tribes.

5. The terminalia of several species of the tribe Miltogrammatini of the subfamily Miltogrammatinae are noted and illustrated. Further studies along these lines will unquestionably reduce the number of genera.

6. The study of the terminalia of *Helicobosca muscaria* and *Helicobosca distinguenda* illustrate the fact that two distinct species may have very similar terminalia.

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Séance du 25 Mai 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

On some Thysanoptera from Cyprus

(Part II)

(with 5 Illustrations)

by Prof. Dr. H. PRIESNER

5. ON SOME FURTHER NEW SPECIES.

Ankothrips (subg. Prionothrips) mavromoustakisi spec. nov.

Female: Head and thorax pale ochreous, faintly shaded with grey, abdomen darker, grey-brown; legs yellow, shaded with grey-brown and therefore of ochreous tint; the long rostrum with a dark brown longitudinal streak, on account of the labrum and the maxillae being darker. Wings rather pale, faintly shaded with yellowish-grey. Bristles dark. Antennae with joint 1 pale yellow (the lightest part of the body), 2 yellow, shaded with grey about basal half or at least distinctly shaded at interior margin, joints 3-9 dark grey, 3 with a pale ring between pedicel and joint. Ocelli brick-red.

Head length ab. 150, total 200 μ, projection in front truncate apically, with 2 bristles of ab. 50 μ length; head breadth across eyes 189-193, across cheeks 236 μ; cheeks arched; eyes small, lateral diameter ab. 63-67 μ; front ocellus much smaller than hind ocelli; interocellar bristles situated about on the tangent or a little within; length of interocellars 70-75 μ; three pairs of long, greyish postocular bristles; *mouth-cone very long*, longest of all species, reaching or surpassing middle of mesosternum, head length including frontal projection and rostrum 535 μ; maxillary palpi long (108 μ), joints 47, 30 and 29 μ; joint 2 of labial palpi 28 μ long; width of mouth-cone at base 225 μ; antennae length about 450 μ; measurements of joints: ?28(43), 43 dorsally, 83-87 ventrally (30), 79(22), 69(21), 55(20), 55(20), 34(16), 22(14), 24(9-10) μ; joint 1 obliquely truncate distally, 2 with projection below which is *conspicuously serrate* at apical margin, its "tooth" usually bifurcate, sometimes tripartite; joints 3-7(-8) with distinct microsetulae, 3' beyond basal

pedicel with a distinct constriction before middle, 4 not constricted; 3 and 4 with a broad, reniform, subapical sense-area; longest bristle on joint 3 ab. 35 μ. Pronotum length ?, width at least 264 μ; 6 pairs of bristles near fore-margin (b.2 somewhat set apart from margin) and ab. 6 pairs at hind margin, longest bristles (3, 5, 6) 63-75 μ; fore femora somewhat enlarged, fore tibiae with a yellow apical spine, fore tarsi unarmed. Pterothorax length 380, width 372 μ; mesoscutum with 2 pairs of bristles, 1 and 3 of which longest, 55 and 63 μ, resp.; metascutum with 1 pair of (40 μ) bristles at base; wings (length 1.176-1.190 mm.) with all veins conspicuous but pale, upper and lower vein set with about 27-30 bristles, not very broad (158 μ across 1st cross-vein) and not broadly but rather narrowly rounded at tip; *abdomen* fusiform, *terminal segments very long*, segment 9 ab. 200, 10 ab. 134 μ long, the former 259-268, the latter 100 μ broad at base, shape conical; *ovipositor very long*, 690 μ; bristles on tergite 9 ab. 118, 118 and 142 μ, on segment 10, b.2 (preapical) ab. 110 μ; besides, there are some apical bristles on segment 10, two pairs of which reach 79 μ; hind tibiae (290 μ) with conspicuous pale bristles which are getting stouter towards tip (longest 55 μ), an erect pale preapical hair is 43-47 μ long. — Male unknown.

Habitat: Cyprus (Limassol), February 1938, in turf (leg. G. A. Mavromoustakis), with *Juniperus* trees nearby which presumably represent the host plant.

I have pleasure in naming this extreme type of *Ankothrips* after its discoverer who has contributed much to our knowledge of the insect fauna of Cyprus.

The new *Ankothrips* species comes — by its long, pointed mouth-cone — close to *A. niezabitowskii* (Schille), and the old genus *Prionothrips* Sch. may be thus reestablished, as a subgenus at least, characterized by the *long and pointed rostrum which far surpasses base of prosternum. A.(P). niezabitowskii*, however, is somewhat smaller, has stouter, less slender antennae, much shorter mouth-cone (head + rostrum 363-400 μ, instead of 535 in *mavromoustakisi*) and much shorter segments 9 and 10 of the abdomen (118 and 90 μ, respectively, in *niezabitowskii*), as well as somewhat longer bristles on the pronotum. All the Nearctic forms and *A. fissidens* (Tryb.) from South Africa have very short rostrum.

Aeolothrips cursor spec. nov.

Female (*f. brachyptera*) : Blackish brown to black, head darkest, prothorax somewhat lighter; abdomen from segment 3-9 with much red pigment; segment 10 as dark as 9; legs dark, trochanters (sometimes also base of middle and hind femora) light, tips of tibiae *not* light but somewhat paler than the remaining part. Colour of the antennae : joint 1 lighter than the head, grey-brown, of about the same shade as the tip of the tibiae or as the

tarsi, *joint 2 clear white, not shaded at base,* 3 white but with about apical two thirds dark, joints 4-9 wholly black, as dark as the head; wing pads colourless at base, dark about the apical half; bristles on abdomen dark. *Segment 2 of the abdomen pale yellow.*

Median length of head from eyes 165, total length 190 μ, breadth across cheeks 195 μ: cheeks somewhat swollen, distinctly convex, set with small bristles; ocelli small (diameter of hind ocelli 10 μ at most), their distance 43-47 μ, in the holotype; two pairs of small bristles at the sides of the dot-like front ocellus, one pair in front of them and one behind (within the ocellar triangle); head somewhat (but little) produced in front, eyes produced on underside towards labrum, lateral length of eyes 70-75, length of cheeks 102-106 μ; maxillary palpi 3-jointed, joints 51, 39 and 6-8 μ; labial palpi 4-jointed, basal joint very short; antennae length 450 μ; measurements of joints: 35-39(42), 67(31), 110(25), 89(24), 87(25-26), 16(19), 14(15), 12(12), 12(7-8) μ; joint 1 broad, 2 slender, 3 with short sense-area (18-20 μ), area on joint 4 not reaching proximal half (length 28-37), curved and more or less dilated distad, *not touching apical margin; joint 5 long, distinctly longer than 6-9 together* (87:59 μ); Pronotum length 170, breadth 238 μ; fore margin straight, *hind margin almost semicircularly rounded,* 5-6 pairs of small bristles on fore margin, 17-20 pairs on disk, and ab. 5 pairs at hind margin, the 2nd from within longest (28 μ). Pterothorax narrow, length ab. 225, breadth 242 μ, about as broad as the pronotum; mesonotum (length 67, width 150 μ) with a pair of micropores in front, a transversal series of 3 pairs of bristles and 1 pair at hind margin, directed inward; metascutum with a pair of micropores in front and a pair of microsetae behind; wing rudiments about 177-200 μ in length, bristles of the pale basal half, pale, in distal half dark; rudiment of upper vein with about 10, of lower vein with 5 bristles; the wing pads attain the end of the pterothorax or the 1st abdominal segment; sternites 3-7 with 1 (lateral) pair of accessory setae; length of tergite 9:95, of tergite 10:83 μ; bristle 1 of tergite 9:87-93, b.2: 169-173, b.3 (lateral) 173-177 μ; bristles on segment 10 about 165-170 μ; fore femora somewhat enlarged, fore tibiae with a pair of apical spines, and the double tarsal hook as usual. — Total body length 1.52 (contracted) to 1.87 mm. (distended).

Male (*f. hemimacroptera*): Much smaller and slenderer, colour of body and antennae similar to that of female but *segments II-IV of the abdomen pale yellow* (IV with a faint shade about the middle of the tergite), joint 1 of the antennae slightly shaded, lighter than in the female, middle and hind femora pale at base, *all tibiae yellowish at tips,* tarsi yellow; *wing pads* much longer than in the female, clear, with *two dark cross-bars,* one broad, occupying the 3rd and 4th seventh of the length (or more), the other occupying the last seventh at apex; hind wing with indication of the cross-bands; otherwise, coloration as in the female.

Wings narrow, costa with 1+16, upper vein with ab. 15-17, lower vein with 15 conspicuous bristles; distal cross-veins not visible. Segment IX of the abdomen *without claspers*, hind margin almost straight, a pair of micropores behind middle 50 μ distant, and two pairs of moderately long postero-marginal bristles (47 and 59-63 μ); Xth tergite simple, evenly rounded apically; no sickle-bristles present.

Measurements of male (allotype) in μ; head length from eyes 138, total 158, width across eyes 150, across cheeks 164; eyes diameter 63; distance of hind ocelli 39, diameter 7; antennae length 363-380; joints from 3rd: 83, 71, 75, 13, 8-10, 10, 10; sense-area on joint 3:10-14, on 4:22 long: pronotum length 130-134, breadth 190; pterothorax breadth 190; wings length 347-355, breadth 55-60; tergite I of abdomen 106 long, length of tergite IX:97, of tergite X:60; bristles on IX:47, 59-63 and 106 (lateral); distance of b.1:51-53; bristles on segment X:130 and 114-122.

Habitat: Cyprus (Limassol), II.1938, in turf; several females (f. brachyptera) and 1 male (f. hemimacroptera).

The interesting characters of this insect are its dimorphism, the pale tips of the tibiae in the male, but not so abruptly as in the *Podaeolella* group, and the hemimacropterous development of the wings in the same sex; the macropterous female is not known yet. The species belongs to the sub-genus *Aeolothrips* (s.str.). It comes close to *Ae.albicinctus* Hal. but much differs by the well developed, bicolorous wing rudiments, the much shorter antennae, prothorax and mesothorax, and the dark segments III and X of the abdomen. The North American *Ae. auricestus* Treh. has much longer antennae, and several of the intermediate abdominal segments yellow; and a yet undescribed Californian form (ex coll. St. F. Bailey) has the antennae slender, joints 1 and 2 dark, 4 pale at base, the wing pads clear, and the abdomen wholly dark.

Haplothrips (Chiraplothrips) graminellus spec. nov.

I had erected the sub-genus *Chiraplothrips* in 1930 (Bull. Soc. Roy. Ent. d'Egypte, p. 271, Pl. XII, Fig. 4) and based on *H. faureanus* m. from South Africa. The main characters of this rather well defined sub-genus lie in the fore femora which have a keel on the apical margin which however does not follow the margin all round but is curved basad, for some distance, interiorly (l.c., Text-Fig. 1); this character and the entire habitus of the insect suggests somewhat the genus *Chirothrips* of the family *Thripidae;* in addition, *Chiraplothrips* is characterized by the presence of but two sense-cones on joint 4 of the antennae.

In 1935 (Bull. Soc. Roy. Ent. d'Egypte, p. 312), I published a note on, and gave the description of, the larva, based on specimens from Cyprus. From the examination of the genital organs of the male, however, it appears

that the Cyprus form is quite different from the South African, and is a proper species. The differences in the male sex may be easily seen from the Figs. 1 and 2. The female only slightly differs, as follows :

Antennae paler with joint 3 pale yellow or only slightly shaded, apical joints appearing more slender than in *faureanus;* example of measurements of joints : 20(b.32, t.25), 42(25), 32(25), 38-39(27), 41(24), 38(19), 32(17), 28(11) μ; *graminellus* is not smaller, but has head (of 7 specimens) from eyes 173-193 μ, whilst it is 191-209 μ long in *faureanus* (5 specimens).

I am unable at the moment to discover further or better structural differences than the above, thus I am unable to distinguish the female with certainty, except by its colour but this may be seasonally variable and may thus vary in either species.

Habitat: *Haplothrips* (*Chiraplothrips*) *graminellus* I possess in a good series of specimens from Cyprus (Cherkes, VIII.1933 and X.1934, from turf; Asomatos, X.1935, from turf (grasses), leg. Mr. G. A. Mavromoustakis) and Syria (Beirut, 21.IV.1935, leg. W. Wittmer), and also from the Sudan (Wad Shair, 21.III.1929, on *Cymbopogon nervatus* Chi., leg. W. P. L. Cameron, No. 129; Managil, Blue Nile Prov., 16.I.1930, in numbers at roots of *Cymbopogon proximus* Stapf., leg. H. B. Johnston, No. 145). — cf. Bull. Soc. Roy. Ent. d'Egypte, 1936, p. 94.

A third species of this group is *Haplothrips* (*Chiraplothrips*) *faureanus*

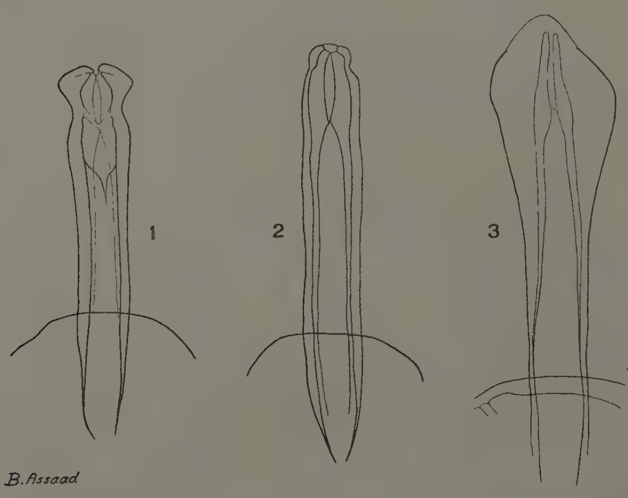

Fig. 1. — *Haplothrips graminellus* spec. nov.: Tip of aedeagus (pseudovirga).
Fig. 2. — *Haplothrips faureanus* Pr.: Tip of aedeagus (pseudovirga).
Fig. 3. — *Haplothrips sudanensis* Pr.: Tip of aedeagus (pseudovirga).

var. *sudanensis* (cf. Bull. Soc. Roy. Ent. d'Egypte, 1936, p. 94) which has to be called now.

Haplothrips (Chiraplothrips) sudanensis Pr.

and which was collected by Mr. W. P. L. Cameron at Tob-el-Ahmar, 16.III.1930, under bark of *Ficus sycomorus* (No. 83); and Saoleil (Blue Nile, Fung Prov.), 3.III.1930, under bark of *Sterculia* (No. 85).

This form is distinguished in both sexes by its shorter head; the male has the apical rod of the copulatory organ — called "pseudovirga" by Fábián — as indicated in Fig. 3, being quite different from that of either *faureanus* (Fig. 2) or *graminellus* (Fig. 1). In connection with these observations on the differences of the copulatory organs of the males of closely related species I am referring to a particular paper on this subject (G. Fábián, Fol. Ent. Hung. IV, 1938, fasc. 1, 2) which ought to be considered by every serious student of this group.

A new species of *Haplothrips* from turf, most probably living on *Gramineae*, is the following :

Haplothrips bolacophilus spec. nov.

Female: Dark brown to black with light red pigment in thorax and abdomen; fore femora and middle and hind legs (including tarsi) wholly dark, fore tibiae yellow, shaded with brown-grey at base and outer margin, fore tarsi yellowish; antennal joints 1 and 2 as dark as head, 3-5-6 yellowish grey, more or less paler at base, none unicolorously yellow; (6)-7-8 grey brown, paler than 1 or 2; wings colourless except bristle plate and scale which are shaded; *prominent bristles of the body colourless.*

Head almost parallel-sided (widened posteriorly in mounted specimens), length 177 - 182, total 193 μ, breadth across eyes ab. 158 - 162 μ, a little wider at cheeks: front ocellus somewhat prominent but not surpassing interantennal projection; eyes ab. 71 μ in diameter; postocular bristles pale, long (70 - 75 μ), pointed or practically so, ab. 20 μ distant from hind margin of eyes; mouth-cone reaching only half across prosternum, narrowly rounded; antennae length 311 - 330 μ, comparatively short, *with short intermediate joints, very short joint 3;* measurements of joints (holotype) : 22-24(b.32, t.27), 42(29), 39(30-31), 45(31), 46(28), 42(24), 42(20), 31(12) μ; or: 25, 45, 41(30), 46-48(32), 48-49, 43, 42, 34 μ; joint 3 asymmetrical, *almost angular beyond base within*, with two pointed, conspicuous sense-cones, 4 with 2+2,5 and 6 with 1+1+¹,7 with 1d; it may be noted that joint 3 is decidedly shorter than either 4 or 5. *Prothorax heavy*, length 177 - 190, width without coxae 277 - 294, incl. coxae 363 μ; *fore legs enlarged* (female !), fore femora may have a diameter of 115 μ when seen from the flat side, fore tibiae thick, *fore tarsi with a large,*

triangular tooth, arising from a broad base; bristles on fore angles distinct, pale as the others, 47 μ, almost pointed or sharply pointed, the inner anteromarginal small, not more than 16 μ in length; posteromarginals blunt at tip but not or hardly dilated, 79-91 μ; also the inner posteroangulars well developed, ab. 59 μ. Pterothorax width 345-380 μ; wings (length ab. 880 μ) fairly broad, much constricted about the middle, fringe smooth (non-plumose), double fringe composed of 5-9 (usually 6 or 7) hairs; basal wing bristles colourless, 51-53, 55-60 and 83 μ in the holotype, distances 16 and 12 μ; b.1 and 2 not quite sharp. Tergite 8 with micropores 55-70 μ apart, and microsetae (3-4) ab. between or somewhat in front; tergite 7 with pores 35-43 μ distant from each other, and setae (2 pairs) somewhat behind (or 1 between); segment IX 87 μ in length, bristles *long*, b.1: 122-132, b.2: 100, b.3: 99-102 μ, all pointed, colourless; tube length (dorsal) 114, (lateral) 130 μ, breadth across base 63, across apex 35 μ; lateral terminal hairs 135 μ.

Male: Similar to female in colour, with antennae almost entirely grey-brown (paler than legs) and joint 3 (or also 4) somewhat yellow exteriorly (as sometimes in *aculeatus* or *juncorum*). Femora of the oedymerous male as in the female but those of the gynaecoid male, smaller than in the normal female (83 μ broad), with tarsal tooth smaller but still arising from a broad base; double fringe 3-7 (usually 4-5). Antennal joints of male : 25(b.31-34), 42(26), 41(27), 48(28), 48-49(27), 45(22), 45(17), 32-34(11) μ; tube (dorsally) 126- (laterally) 134, width at base 60, at apex 34 μ; b.1 of segment IX 146, b.2: 40, b.3: 138 μ. Penis (pseudovirga) will be described later, as it cannot be seen well from the specimens at hand; it looks to be parallelsided and narrowed just before tip.

Habitat: Cyprus (Asomatos), males and females, August 1935, in turf; 1 female, Limassol, III.1935 (ex coll. D. Moulton, No. 5361), leg. G. A. Mavromoustakis.

This new species of the sub-genus *Haplothrips* (s.str.) belongs into the section of species having smooth fringe hairs and short tube. Comparing it with the species having pointed prothoracic setae (e.g. *aculeatus*, *juncorum* and *caespitis*) it differs from all forms by its heavy fore legs and the broadly triangular tarsal tooth; in the group of species which have the prominent bristles distinctly knobbed, there are *leptadeniae* and *atriplicis* the only ones in which the fore legs are enlarged in the female sex; the former, however, has tips of tibiae, the tarsi and antennal joints 3-6 pale yellow, the bristles blackish and distinctly knobbed, wings narrow and on antennal joint 3 only 1 sense-cone; in *atriplicis* — in which the colour of the middle and hind legs are about as in *leptadeniae* — are the bristles shorter and distinctly blunt, the tube shorter, the wings narrower, the head more elongate, the whole insect is smaller. In general, for *bolacophilus*, the angular form of the 3rd antennal joint is characteristic.

6. ON TAENIOTHRIPS CROCEICOLLIS AND COLLEMBOLOTHRIPS MEDITERRANEUS.

Taeniothrips croceicollis (Costa).

The description of the male (*f. brachyptera*) : Coloration similar as in the female, brown, pterothorax orange ; fore-tibiae yellowish, shaded with grey exteriorly, middle and hind tibiae yellowish at base and apex ; tarsi yellow ; antennal joint 1 as dark as head, 2 yellowish, shaded at base and at exterior and interior margin ; 3-5 pale yellow, 5 slightly shaded apically, 6-8 pale grey-brown, 6 light yellow basally ; major bristles on body dark.

Ocelli small, interocellar bristles on or outside the tangent, 2 pairs of small anteocellars ; joints 3 and 4 of the antennae hardly constricted before apex, 6 with short pedicel ; hind margin with only two pairs of small interior bristles ; wing rudiments short, attaining about the end of the mesopleurae ; glandular areas on sternites 3-7 strongly transverse, narrow ; tergite 9 with a group of 4 stout spines medianly, and a longer, finer spine laterally ; hind margin of tergite 9 slightly emarginate and indistinctly crenulate medianly.

Measurements in μ : Head length from eyes 138-142, total 162, breadth across eyes 169-173, across cheeks 170 ; eyes diameter 67 ; distance of int. margin of hind ocelli 35-37 ; length of interocellar bristles and of largest postocular bristle (b. 2) 39 ; antennae length 310 ; joints 22(b.36, t.28-31), 39(31), 53-56(22), 50-53(22), 43(18), 59(20), 11-13(8), 17-18(6-7) ; pronotum length 120, breadth 217 ; posteroangulars 55-63 ; pterothorax breadth 242 ; glandular areas on sternites lengths ab. 8, widths 77, 75, 73, 75, 70 ; length of segment 9 (dors.) 91-93, dorsal spines 26-28 and 18-20, lateral spine 28-32 ; dorso-lateral hair ab. 106, lateral bristle 130-135.

H a b i t a t : Cyprus (Limassol : Yermasoyia river), 22.II.33, on *Scilla* (leg. G. A. M a v r o m o u s t a k i s).

Collembolothrips mediterraneus Pr.

(Bull. Soc. Roy. Ent. d'Egypte, 1935, p. 308, fig.)

(Fig. 4)

This insect was described after a unique specimen ; further material (females only), collected by Mr. G. A. M a v r o m o u s t a k i s, reveals that the coloration is usually somewhat darker than indicated in the original description. Furthermore, there was an important character omitted, as it was not shown in the type preparation owing to the position of the fore legs ; *these are not unarmed, as previously thought but bear a conspicuous tooth on the fore tarsi*, as may be seen from Fig. 4.

Collembolothrips comes rather close to *Sitothrips* (based on *Sitothrips arabicus* from Egypt and Palestine) but differs — apart from the entire absence of wings and ocelli — by the rather prominent interior bristle of

the fore margin of the pronotum which may be directed backward or inward, and by the absence of the *terminal claw* of the fore tarsus (Fig. 4) which is very well developed in *S. arabicus* (Fig. 5). I had been considering the possibility of *C. mediterraneus* being the apterous form of a *Sitothrips* spec. but according to the above mentioned characters, this is out of question, though both forms — as to their general habitus — are somewhat convergent.

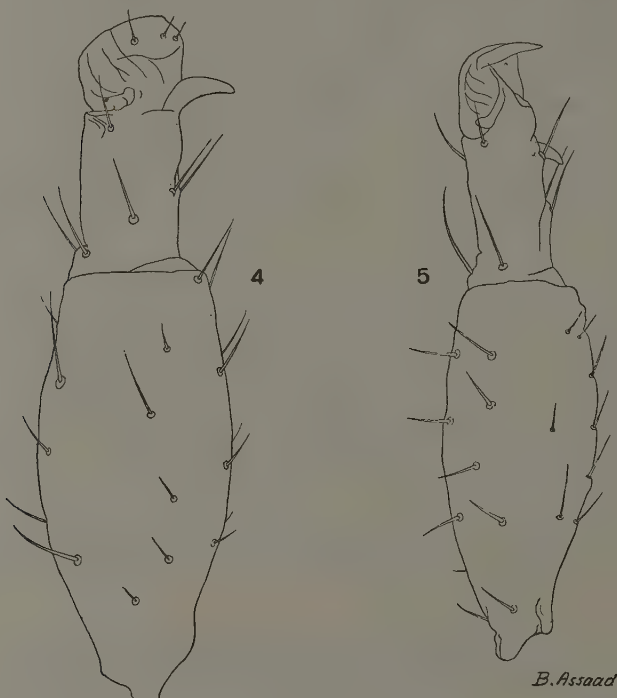

Fig. 4. — *Collembolothrips mediterraneus* Pr.: Tibia and tarsus of fore leg of female.

Fig. 5. — *Sitothrips arabicus* Pr.: Tibia and tarsus of fore leg of female.

7. A LIST OF CYPRIAN SPECIES COLLECTED BY MR. G. A. MAVROMOUSTAKIS

(Species marked with an asterisk are newly discovered by Mr. G. A. Mavromoustakis)

Fam. Aeolothripidae.

* **Ankothrips mavromoustakisi Pr.**

Limassol, II, in turf.

Melanthrips fuscus (Sulzer).

Common in spring flowers (e.g. *Sinapis*, and other *Cruciferae*, *Scilla*) around Limassol (Yermasoyia river, Spalagiotissa Monastery, Ayia Irini hills), I-III.

Melanthrips pallidior Pr.

Common but less numerous than the former, in spring flowers (e.g. *Cruciferae*, *Papaver*) ; Limassol, Pyrgos, II-III.

Aeolothrips gloriosus Bagn.

Females only, in flowers of *Ulex* and *Sinapis* ; Limassol, Yermasoyia river, from II-III.

Aeolothrips spec. (fasciatus-group).

Fairly common in flowers of *Scilla* and *Papaver* ; Limassol, Yermasoyia river, II-III. This species requres further comparative examination.

* **Aeolothrips cursor Pr.**

II, in turf, Limassol.

Rhipidothrips gratiosus Uzel.

Limassol, Spalagiotissa Monastery, III.

Fam. Thripidae.

Chirothrips (2 spp.).

Require further examination.

* **Limothrips nov. spec.**

As above.

Aptinothrips rufus (Gmelin).

In turf, Limassol, II.

Scirtothrips antilope Pr.

In turf, Cherkes, VIII.

Anaphothrips alternans Bagn.

♀ f. brachyptera, in turf, Limassol, III.

* **Anaphothrips graminum Pr.**

From turf, Asomatos, VIII-X.

Odontothrips karnyi Pr.

On *Ulex;* Limassol, Yermasoyia river, Pyrgos, II.

Taeniothrips croceicollis (Costa).

In flowers of *Scilla* and *Sinapis;* Limassol, Yermasoyia river, Pyrgos, II-III.

* **Taeniothrips falsus Pr.**

From turf, Limassol, Cherkes, III, VIII.

Taeniothrips pallidivestis Pr.

From turf, Limassol, Asomatos, Cherkes, VIII-X.

Taeniothrips discolor (Karny) and f. lythri Karny.

From turf, Limassol, Asomatos, Cherkes, III, VIII and X.

Taeniothrips meridionalis Pr.

Very common in many species of flowers, as e.g. *Scilla, Ulex; Sinapis* and other *Cruciferae; Tamarix, Achillea;* Limassol and surroundings, Mt. Troodos: also Nicosia (leg. G. H. Morris). — I-III, VI.

Taeniothrips atratus (Hal.).

Seems to be confined to the mountains; Mt. Troodos, VI.

Taeniothrips inconsequens (Uzel).

Both sexes from turf and flowers of *Papaver*, II, III.

Thrips major var. gracilicornis Uz.

May be composed of various forms or races. In flowers of *Ulex, Pistacia* and *Tamarix;* Limassol (also Pyrgos, Yermasoyia river, Ayia Irini hills, Spalagiotissa Mon.); on Mt. Troodos, a form was found which is probably identical with f. *dorsimaculata* and f. *adusta.*

Sitothrips arabicus Pr.

In flowers of *Cruciferae*, females only. Limassol and surroundings, III.

* **Collembolothrips mediterraneus Pr.**

In turf, females only. Limassol, II-III, XI.

Thrips tabaci Lind. and f. pulla Uz.

Abundant in flowers, turf, on crops, most likely all over the island, I-III but obviously all the year round. No male yet recorded from Cyprus.

Thrips angusticeps Uz. (f. brachyptera and f. macroptera).

Common in spring flowers, as *Sinapis, Papaver, Scilla*, in turf, II-III, VI. Region of Limassol, Mt. Troodos.

Thrips ebneri Karny.

Uncommon; Limassol, III.

Thrips minutissimus L., Uz., and f. obscura Coesf.

In flowers as *Scilla, Pistacia* but also on *Tamarix*. Limassol (Spalagiotissa Mon., Yermasoyia river), III.

Thrips mareoticus (Pr.).

Region of Limassol, not rare in flowers, III.

Stenothrips graminum Uz.

Limassol (Spalagiotissa Mon.), III.

Fam. Phlaeothripidae.

Haplothrips hispanicus Pr.

Limassol, III..

Haplothrips distinguendus Uz.

Limassol, III (1 male).

Haplothrips palaestinensis Pr.

Limassol, III, both sexes.

Haplothrips gowdeyi (Frkl.).

From turf, Cherkes and Krios river near Ayia Mavri (2000 ft. alt.), IX, X, *both sexes.*

Haplothrips cypriotes Pr.

In flowers, e.g. *Ulex, Pistacia;* Limassol (Yermasoyia river, Pyrgos, Ayia Irini hills), Krios river (2000 ft.), II, III, IX.

* **Haplothrips bolacophilus Pr.**

From turf, Limassol and Asomatos, III, VIII.

Haplothrips flavicinctus (Karny).

From turf, Cherkes, VIII, X, both sexes.

Haplothrips (Chiraplothrips) graminellus Pr.

From turf, Cherkes and Asomatos, VIII, X, both sexes.

Podothrips aegyptiacus Pr.

In turf, Limassol, XI, both sexes.

Liothrips pragensis Uz.

On leaves of *Quercus;* Krios river, Ayia Mavri (2000 ft. alt.), IX, both sexes.

Bacillothrips spec.

From turf, Limassol, XI, 1 male.

Compsothrips albosignatus (Reut.).

From Turf, Krios river. Ayia Mavri (2000 ft. alt.), XI. 1 male (gynaecoid).

Contributions towards a knowledge of the Thysanoptera of Egypt, XII.

(with 10 Illustrations)

by Prof. Dr. H. PRIESNER

34. ON SOME TAMARISK THRIPS

The common tamarisk thrips is *Liothrips reuteri* (Bagn.) (=*dampfi* Ka.), living on the leaves and twigs. The flowers are inhabited by two hitherto unrecorded species, viz., *Oxythrips tamaricis* (Bagn.) and *Haplothrips tamaricinus* spec. nov.

Oxythrips tamaricis (Bagnall).

(Figs. 1-4)

1926. *Anaphothrips tamaricis* Bagnall, Ann. Mag. Nat. Hist. (9), vol. xviii, p. 645.
1928. *Anaphothrips tamaricis* Priesner, Thys. Eur., p. 712.
1935. *Anaphothrips tamaricis* Bagnall & John, Ann. Soc. Ent. France, CIV, p. 316.

Synonym: *Oxythrips navasi* Bagnall, Ann. Mag. Nat Hist. (9), XVIII, 1926, p. 648.

This species — hitherto known from France and Spain — is common in Egypt in the flowers of *Tamarix nilotica* and perhaps other species of this plant genus; I collected it in 1934 (13th March) in the Oasis Dakhla and in 1937 (9th April) in the Wadi Gederât, in Sinai; stray specimens also in the latter locality, on wheat and on *Juncus* sp.; a further series of specimens I received from Moh. Eff. Hussein who collected them in the Oasis Siwa; a teneral single specimen was sent to me by Dr. E. Rivnay, taken on *Suaeda* at Kali Roy, Transjordania (23/IV/1935); the oldest record is due to Dr. C. B. Williams who collected the insect from *Tamarix* flowers in the Oasis Baharia (23/III/1925); Dr. J. D. Hood communicated to me the latter specimen for comparison (No. 341).

Some specimens of this variable species are somewhat or much lighter in colour than those previously described by Bagnall and myself; the antennal joints and the fore legs may be light greyish yellow — but are seldom quite clear yellow —, and the wings may be rather pale, or even colourless at base, gradually darkened towards tip where they are darkest; the thorax may show an orange tint in such specimens, or the prothorax

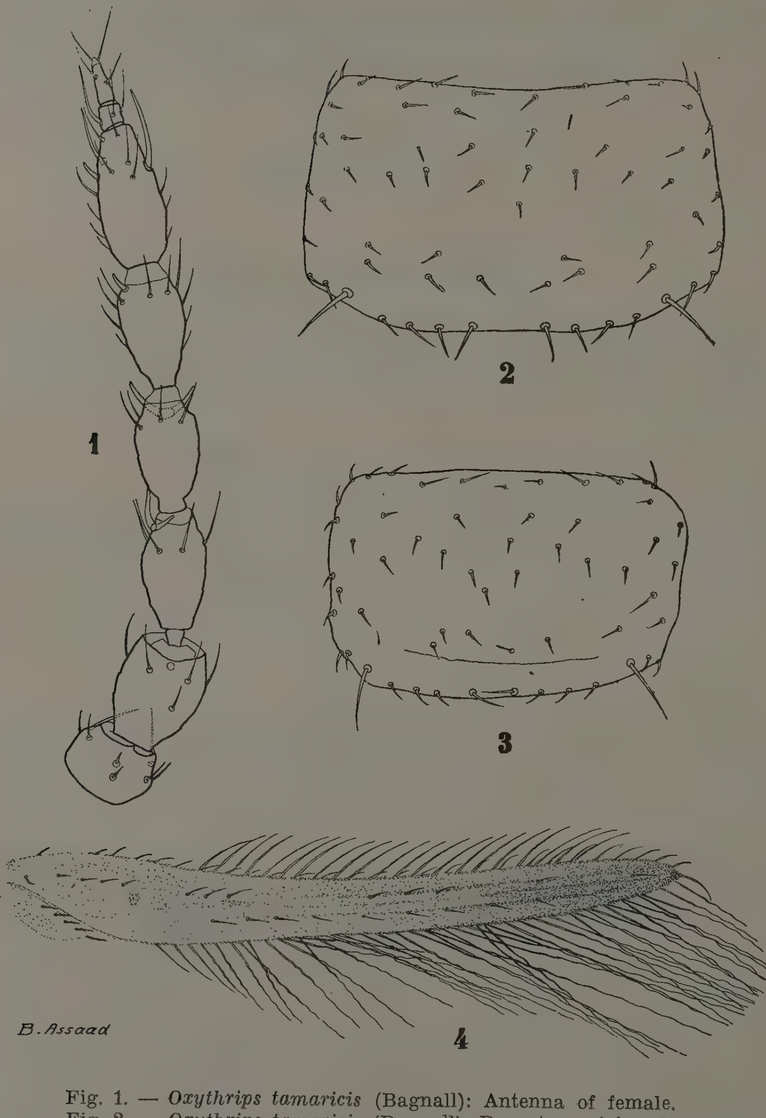

Fig. 1. — *Oxythrips tamaricis* (Bagnall): Antenna of female.
Fig. 2. — *Oxythrips tamaricis* (Bagnall): Pronotum of female.
Fig. 3. — *Oxythrips tamaricis* (Bagnall): Pronotum of male.
Fig. 4. — *Oxythrips tamaricis* (Bagnall): Fore wing of female.

may be entirely yellow, the pterothorax orange, the abdomen and the middle and hind legs brown. The usually very short posteroangular bristle of the pronotum may attain a length of 30 μ, and the bristles of abdominal segment 9, b.1, may be 67 μ long instead of 55 μ. In one and the same inflorescence one may find specimens with typical, and others with longer and more slender antennae.

To Bagnall's description of the male, which is as dark as the female, I should add that the glandular areas of the sternites 3-6 are *small*, their breadths 17, 24, 25 and 24 μ, respectively, and that the bristles at the hind angles of the pronotum are relatively *longer* than in the female,, 28-31 μ, as distinct as in any other *Oxythrips* of the same habitus, and I have therefore transferred this species from the genus *Anaphothrips* in *Oxythrips*.

Oxythrips navasi, described by Bagnall in the same paper in which he dealt with *A. tamaricis*, is an outright synonym of the latter.

Haplothrips tamaricinus spec. nov.

(Figs. 5 and 6)

This is one of the smallest species of the genus, with very short antennae, particularly short apical joints.

Female: Dark brown to blackish brown, legs (including middle and hind tarsi) dark, fore tibiae lighter towards tip, or shaded at the margins only, fore tarsi greyish yellow to yellow; antennal joints 1 and 2 dark, 3 pale yellow with a slight shade of grey, 4-6 yellowish grey, paler at base, 6 darkest, 7-8 unicolorously brown, 3-6 in some cases paler (1); wings clear, except at extreme base and scale, bristle-plate shaded at base only. Cephalic and prothoracic bristles pale or shaded, at least basally, those on the abdomen light, wing retaining spines dark; head, thorax and sides of abdomen slightly suffused with red.

Head short, length 173 (total 187), width 181 μ, in the holotype: front ocellus surpassing fore margin of eyes, situated on a low hump, on the same plane as the interantennal projection; hind ocelli well in front of the middle of the eyes, the lateral diameter of the latter 77 μ; postocular bristles very moderately long, dark or at least slightly shaded, blunt, 24-30 μ in length, 12-14 μ distant from the hind margin of the eyes; mouth-cone short, very broadly rounded; antennae length 260-277 μ; measurements of joints, ? (27-28), 43(28), 39-41(26), 41(29), 39(27), 37-39(25), 32-34(29), 24(13-14) μ; joints very short, 3 somewhat asymmetrical, 5 and 6 slightly truncate apically, 6 broad, not or very little narrowed apically, forming one unit together with

(1) The specimens from Siwa (September) are paler in colour than those of Sinai (April), and have clear prothoracic bristles, the former obviously belonging to a summer generation.

7 and 8, the latter broad at base; sense-cones short, joint 3 with 2 (but the interior very small, easily overlooked), 4 with 4, 5 with 2+[1], 6 with 2+[1], 7 with 1d; those on 3 or 4 about 11-13 μ in length. Prothorax short, pronotum length 100-103, width 248 (incl. coxae 270) μ, in the holotype; *bristles on fore margin well developed*, exteriors about 28 μ; the four postero-angulars 43-49 μ; all prothoracic bristles straight, somewhat dilated at tips, opened. Pterothorax about 310 μ long and broad; wings normal,

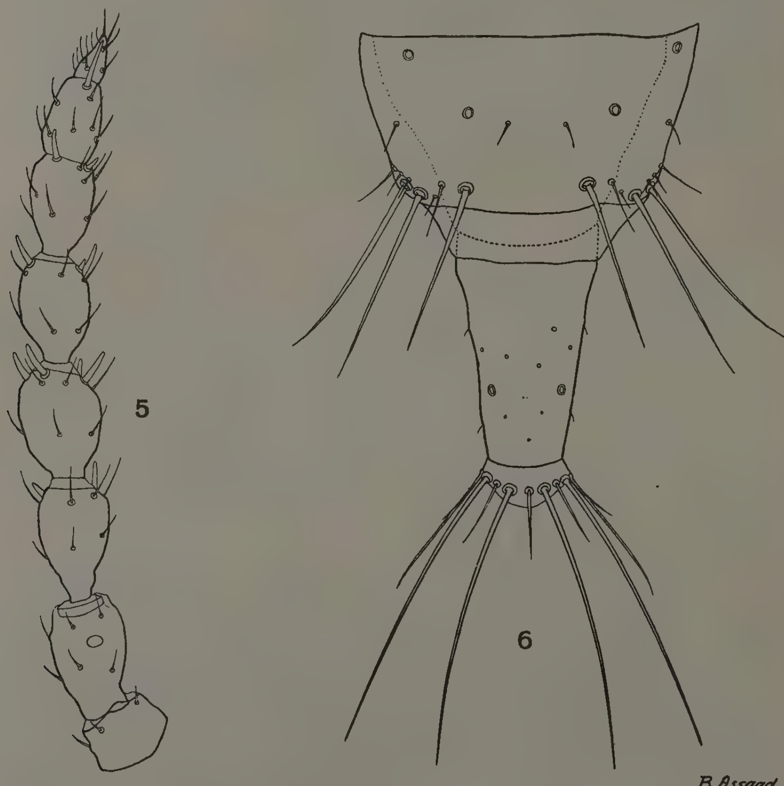

Fig. 5. — *Haplothrips tamaricinus* spec. nov.: Antenna of female.
Fig. 6. — *Haplothrips tamaricinus* spec. nov.: Tip of abdomen of female.

distinctly narrowed in the middle, length 727 μ, basal bristles pale, all dilated apically, 37-40, 37 and 43-45 in length; interlocated fringe hairs 6-8; fringe not plumose; micro-pores on tergite 7 20-32 μ distant from each other,

50-55 μ on segment 8; there are 3 small setae behind the micro-pores on 8, and 2-4 laterals on 7; abdominal segments short, 2nd 67-71, 8th ab.80, 9th about 70 μ; tube short, almost parallel-sided at basal fourth, then abruptly conically tapering towards apex, length 83 (lateral 89) μ, width across base 50-53, at apex 32 μ; bristles on segment 9, b.1: 67-73, b.2: 75 μ pointed; terminal hairs about 100 μ in length. Fore femora not enlarged, fore tarsi with a *very* small tooth within, which is somewhat directed forward.

Male: The gynaecoid form very similar to the female, also in the shape of the antennal joints; the oedymerous one — as usual — with much more slender antennae; colour as in the female, tarsal tooth larger. The chitinous tip of the male genitalia is about 50 μ long, parallel-sided, evenly rounded at tip, not emarginated. Measurements of allotype (gynaecoid) in μ: Head length 177 (total 185), width across cheeks 166; eyes (lat.) 79; antennae 277; joints, from 2nd: 42(25), 41-42(25), 41-42(27), 38(25), 36(24), 31-32(20), 22-23(11); pronotum length 95, postero-angular bristles' length 39-43; basal wing bristles 39, 37-39, 43; tube dorsally 93, laterally 95; bristle 1 on segment 9: 83, b.2: 28-30 (spiniform), b.3: 87; — In the oedymerous form, the antennae are more slender, e.g.: (from joint 2) 42(25), 42(25), 42-45(27), 45(24), 42(21), 49(19), 24(12), the apical joints are much longer and more slender; fore legs enlarged, fore tarsal tooth triangular, broad at base; tube 99 (lat. 110), width 47, at tip 30.

The new species is a member of the subgenus *Haplothrips* s.str., and therein it belongs to the section having smooth fringe hairs and a tarsal tooth in both sexes; the blunt bristles and the short tube exclude for comparison a large number of species; *mesembrianthemi* Pr. has much longer prothoracic bristles, and many similar species have elongated (at least) terminal antennal joints; thus there is only *H. gowdeyi* (Frkl.) left for comparison; but even this species, known by its short intermediate antennal joints, has longer joints, much longer bristles and a longer tube, furthermore, joint 6 of the antennae is distinctly narrowed (towards tip as well), and b.3 of the basal wing bristles is long and pointed, in *gowdeyi*.

Habitat: A few specimens of this interesting species I discovered in the flowers of *Tamarix* spec. (along with *Oxythrips tamaricis*) in Sinai (Wadi Gederât), 9/IV/37; in greater numbers, this insect was found by the Locust specialist of the Ministry of Agriculture, Moh. Eff. Hussein, in the Oasis Siwa, 3/IX/37, in the flowers of *Tamarix* spec. The larva is not yet known.

35. ON A GENUS AND A SUBGENUS, BOTH HITHERTO NOT RECORDED FROM EGYPT.

Poethrips willcocksi spec. nov.

(Figs. 7-9)

? *Stenothrips* spec., Willcocks, The insects and related pests of Egypt, vol. II, p. 83, No. 7; p. 413, fig. 92 (c).

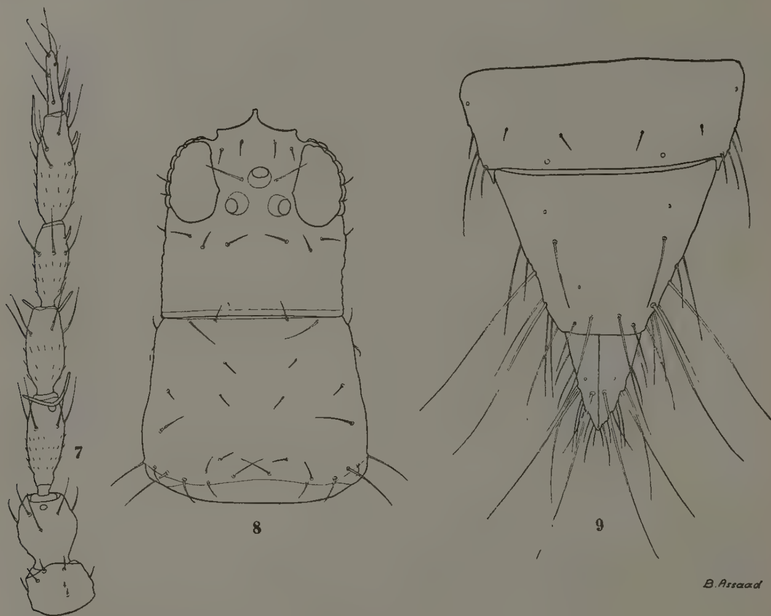

Fig. 7. — *Poethrips willcocksi* spec. nov.: Antenna of female.
Fig. 8. — *Poethrips willcocksi* spec. nov.: Head and prothorax of female.
Fig. 9. — *Poetnrips willcocksi* spec. nov.: Tip of abdomen of female.

Female: Blackish brown, with pterothorax somewhat lighter; legs dark, fore tibiae pale lemon yellow, excepting their extreme base; all tarsi yellow; joints 1 and 2 of the antennae dark, the latter somewhat paler at apex, 3 to 5 pale lemon yellow, 6 *yellow in basal half, slightly shaded with grey in apical half*, almost entirely yellow in paler specimens, 7 wholly pale grey; wings practically colourless, cilia slightly shaded; bristles on pronotum faintly shaded, those on tip of abdomen dark.

Head large and longish, about 146 μ long, 165-181 μ including process, width across eyes or cheeks 150; eyes longish, length (lat.) 63-67 μ, 2-3

ommatidia are larger, and orange in colour; head produced in front, this produced part comparatively narrow, not exactly beginning from the fore margin of the eyes but somewhat within; front ocellus situated about the middle of the inner margin of the eyes; two pairs of small anteocellar and 1 pair of larger (32 μ) interocellar bristles, the latter at the sides of the front ocellus but on a somewhat lower plane, on or outside the tangent; hind ocelli well separated, distance 32 μ, pigment crimson; cross-wrinkles on vertex indistinct; postoculars far from hind ocelli, all about on one transversal line, and not encircling the eyes, the innermost (b. 1) about 22 - 26 μ, b.3 about as long (28 μ), and both longer than b.2; b.3 nearest to the eyes; maxillary palpi 2-jointed; antennae length 268 - 277 μ; joints. 22(31), 36(28), 48-49(19), 42(19), 39(17), 55-56(20), 29-31(7) μ; joint 2 somewhat globular, 3 slightly asymmetrical, not constricted apically, the forked sense-cones fine, joint 6 narrow at base, 7 long, not distinctly conical as this is usually the case; the outer sense-cone on joint 6 very short, 6 μ, the inner moderately long, 22 μ, the ventral one about 14 μ; sense-cone near base of joint 7 about 15 μ in length. Pronotum length 136 - 138μ, with 185μ; sides widened towards base but hardly convex; fore margin with four pairs of bristles, the 2nd of which (from within) longest (24 μ), much longer than in *P. furcatus* Faure, judging from the illustration given by Faure [2]; bristles on hind angles thin but well developed, the inner 43 - 51, the outer 37 - 39 μ long; hind margin within, normally with 3 pairs of small bristles; disk very sparingly set with (ab. 9) small hairs; surface of pronotum nearly smooth, cross-wrinkles not conspicuous; bristles on metascutum fine, the two basal pairs close to each other; the net-like structure of the centre of the metascutum very faint but the meshes are coarse; pterothorax width 233 - 235; the colourless wings have a length of 744 μ; veins pale but distinct; *bristles on wing almost colourless;* scale with 1 - 4, costa with 5 - 7 bristles before the beginning of the fringe, in the whole with not more than 19 - 22 bristles, which considerably increase in length towards tip of wing; upper vein with 4+3(4) basal and 2 distal bristles; lower vein with 8 - 10 bristles in the two females at hand. Pores on the tergites of the abdomen very close to the hind margin (generic character); hind margin somewhat fringe-like or very unevenly and indistinctly serrate, tergite 8 as the others, i.e. without a distinct "comb"; also the sternites somewhat wavy, without accessory setae but with 3 pairs of hind marginal hairs; tergite 9 conical, *long*, 134 - 140 μ, tergite 10 split above for its entire length; bristles on 9, 114 - 122, b.2: 138 - 146, b.3: 142 - 158 μ; b.1, 2 on segment 10: 134 - 138 μ. Fore femora (width 50 μ) little stouter than the fore tibiae (width 42 μ); hind tibiae at their inner margin with only 3 - 6 spines (beside the pair of apical spurs); ovipositor length at least 284 μ. Total body length (distended) 1.41 - 1.45 mm., much distended almost 1.7 mm.

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(2) Bull. Brooklyn Ent. Soc., XXVIII, p. 18, Pl. I, fig. 3.

Male: Smaller but colour and structure as in the female. Crosswinkles all over the sternites and on the sides of the tergites conspicuous; glandular areas wanting; tergite 9 about 55 μ in length, hind margin divided into three equal portions by the presence of two long, outwardly curved chitinous teeth (length 24-28 μ); the lateral parts of the hind margin fairly straight, the median part deeply emarginated between the teeth; a long lateral bristle on tergite 9: 126-134 μ, a lower one ab. 100 μ; the upper pair of bristles on segment 10 is 118 μ long, inwardly curved; these bristles are not stout.

Measurements in μ: head length from eyes 130, total 154; dorsal length of eyes 71; antennae length 252 μ, joints, 20(28), 32-34(24), 43-45(16), 39(17), 34(15), 52(17), 27(7) μ; pronotum length 120, width 165; postero-angular bristles 35-39, exteriors 28-34; pterothorax width 205; wings length 640; total body length (normal distension) 1.09 mm.

This species is the only hitherto known palaearctic representative of this genus which was erected by Faure on a South African species, *P. furcatus* Faure; the Egyptian species differs in the somewhat greater length of the major bristles but shorter b. 2 of the fore marginals of the pronotum, in having joint 6 of the antennae not entirely dark brown, and the fore tibiae shaded at base only.

Habitat: Years ago I received a single female of this form from Mr. F. Willcocks — to whom I have pleasure of dedicating it — who discovered it on 28.V.1923 on "*Imperata*" grass in the laboratory garden at Gezira (Cairo); in 1937 only, I succeeded in collecting a few specimens of this no doubt uncommon insect, viz., from *Polypogon monspeliensis* and *Imperata arundinacea*, at Meadi and Doqqi, in October and November, respectively. The larva remains yet unknown.

The following is an interesting new form which is difficult to place; its appearance is that of an *Anaphothrips* but the prothorax bears two pairs of fairly well developed, hyaline, postero-angular bristles. I consider it as the representative of a new subgenus:

Subg. Hyalopterothrips nov.

Antennae slender, 8-jointed, style long, sense-cones on 3 and 4 moderately long, forked; maxillary palpi 3-jointed; Head transverse, not produced in front; interocellar bristles *stout*, *hyaline*; legs slender; postero-angular bristles of the pronotum moderately long, hyaline; wings broad, colourless, veins very conspicuous, the hyaline wing bristles decidedly more conspicuous than in the bulk of the *Anaphothrips* spp.; *no* distinct paired bristles in the middle of the tergites; dorsal bristles on segment 9 short, apicals moderately long.

Type subgenus: *Anaphothrips* (*Hyalopterothrips*) *crocatus* spec. nov.

Anaphothrips (Hyalopterothrips) crocatus spec. nov.
(Fig. 10)

F e m a l e: Orange-yellow; tip of mouth-cone, sides or fore margin of pterothorax and the abdomen more or less distinctly shaded with grey-brown; abdomen at least from segment 7 onwards brown; middle and hind femora slightly shaded, except apical third or so of middle, and tip of hind femora; tibiae with a touch of light brown about the middle, or at the outer margins only; antennae yellowish but joints 2 and 4 slightly shaded; joints 5-8 dark brown (the darkest parts of the whole body); eyes black, ocelli with crimson pigment; bristles on head, thorax and wings hyaline, those on tip of abdomen dark.

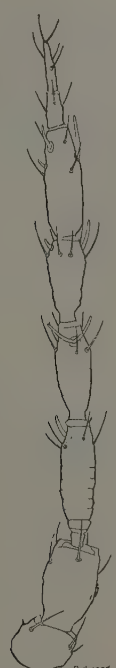

Fig. 10. — *Anaphothrips* (*Hyalopterothrips*) *crocatus* spec. nov.: Antenna of female.

Head transverse, length from eyes 102-106, total 114 μ, somewhat convex in front, between the eyes, *not* produced; eyes length about 67 μ, some ommata larger and orange in colour; interocellar bristles in normal position, about the tangent, 35-40 μ in length; postoculars inconspicuous; vertex with fine, dense cross-wrinkles; mouth-cone well developed, pointed,

maxillary palpi slender, joints: 24, 16 and 16-18 μ long; antennae about 310 μ, slender; measurements of joints: 17(27-28), 42(28), 60(17), 46(18), 38 (18), 55(18), 17-18(8), 24-25(5) μ; joint 3 very slender, with double-constriction at base, not or hardly constricted at apex, sense-cones on it and on joint 4 forked, very moderate in length, 4 much shorter than 3, sense-cones on 6 not or little surpassing the tip of the joint; style very long and slender. Pronotum length about 146 μ, width 225-242 μ; bristles on fore margin inconspicuous, those on hind angles hyaline, rather stout, the inner bristles 47-51, the outer 43-45 μ; the innermost of the hind marginals is 28 μ long, other bristles of the latter series are not seen in the unique preparation, they may be very small. Pterothorax width 303, length 295 μ; wings length 830-848 μ; they are colourless including setae and fringe; width of wings (behind scale) 89 μ, in apical third about 67 μ; costa with about 8 bristles before the beginning of the fringe, and with ab.34 densely set bristles as a whole; upper vein with 4+4 basal and 1+1+1 (on one side irregularly 2+1) distal bristles; *lower vein with only 4 about equidistant bristles;* 2 pairs of bristles on base of metascutum, pale; pores on tergite 1 close to each other; no accessory bristles on the sternites, no comb on tergite 8; segments 9 and 10 short, dorsal bristles on 9 short, 24 μ, apicals 1 and 2, 87, b.3 80 μ; 10th segment (length 75 μ) almost entirely split above, bristles 2 weak, 55-60 μ long; width of abdomen across segment 4: ab.400 μ; ovipositor length ab. 248, fore tibiae length 166, hind tibiae 205 μ; the 8 spines on inner margin fine.

Male unknown.

Habitat: A single specimen of this insect was collected by Mr. A. Rabinovitch, most likely beaten from bushes of *Zygophyllum decumbens*, on March 13th, 1937, in the Wadi Gederât, Sinai.

Eine neue *Prosopis*-Art aus Aegypten

von J. D. Alfken, Bremen.

Von Herrn Professor Dr. H. Priesner erhielt ich einige Bienen zur Bestimmung, under denen sich die nachfolgend beschriebene *Prosopis*-Art befand.

Prosopis lutea nov. spec. — ♀ : 8-10 mm. lang. Gelb. Am Kopf eine schmale Querbinde der Stirn, 2 von dieser aus nach unten verlaufende, gebogene Streifchen und die kurzen Augenfurchen schwarz. Scheitel schwarz oder rostrot. Fühler rostrot, Schaft vorn gelbrot, Geiszel oben braun. Am Thorax die Scheibe des Mesonotums schwarz oder schwarzbraun, in diese Färbung ziehen sich vom Grunde her 2 gelbe Strichelchen, sodass das Dunkle dort in 3 Flecke aufgelöst ist. Mittelfeld des Mittelsegments gelb oder schwarz gefärbt. Die Färbung des Hinterleibs verschwommen. 1. und 2. Tergit rotbraun, mit rundlichen gelben Seitenflecken, das 1. mit mehreren schwarzen Flecken auf der Scheibe, das 2. schwarz überlaufen, 3. und 4. rotgelb, 5. hellgelb gefärbt. Bauch verschwommen gelbrot, 1. Sternit ganz schwarz oder schwarz und in der Mitte rot gefärbt.

Kopf rund. Hopfschild und Wangen fein längsgefurcht und auszerdem fein und mäszig dicht punktiert. Augenfurchen tief. Mesonotum dicht und fein, Schildchen zerstreut und kräftig punktiert. Mittelfeld des Mittelsegments glänzend, am Grunde ziemlich kräftig, am Ende feiner gerunzelt. Tergite ein wenig glänzend, gleichmäszig dicht und fein, das 1. etwas stärker punktiert. Bauch glänzend, Sternite am Grunde kräftiger, am Ende feiner punktiert, das 3. in der Mitte des Grundes mit einer erhabenen, rundlichen, punktlosen Platte, nur bei ausgezogenen Sterniten gut zu erkennen. Beine rostrot, Schienen mehr oder weniger schwarzbraun gefärbt. Flügel kaum getrübt, Adern und Mal schwarzbraun.

♂ : 8-9 mm. lang. Dem ♀ ähnlich, die Färbung heller und klarer. Fühler rostrot. Schaft vorn und Pedicillus ganz gelb gefärbt, ersterer rundlich erweitert, ähnlich wie der von *Prosopis annulata* L. gestaltet. Kopf und Thorax wie beim ♀ gefärbt. Mittelsegment hellgelb oder gelbbraun. 1. Tergit am Grunde, den Seiten und am Ende rostrot, 2. am niedergedrückten Endrande schmutzigrot oder rotbraun, die übrigen hell, am Ende verwaschen rot gefärbt. 3. Sternit in der Mitte des Grundes mit einer glänzenden, punktlosen, beulenartig vorstehenden Platte. Beine rostrot und gelb gezeichnet. Flügel ein wenig heller als beim ♀.

Diese prächtige, bunte Art, die im System neben die algerische *Prosopis quartinae* Grib. zu stellen ist, ist wegen ihrer Färbung unverkennbar.

Vorkommen: Ghammaza, 30.5.1933, ein ♀ (Typus, in meiner Sammlung); Heluan, 12.6.1933, ein ♀ (Paratypus, Sammlung des Ackerbauministeriums); Wadi Mallan, Mai, 1932, 3 ♂♂ (Paratypen, Sammlung des Ackerbauministeriums und meine Sammlung); Kerdasa, 11.6.1933, ein ♂ (Allotypus, meine Sammlung).

Séance du 22 Juin 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

Admissions :

Sont admis à faire partie de la Société en qualité de membres titulaires :
Messieurs le Docteur MOHAMED SHAFIK, le Docteur ASSAAD DAOUD HANNA, le Docteur ABDEL AZIZ GHABN, MOHAMED NOMAN, MOHAMED SOLIMAN EL ZOHEIRY, MOHAMED SOLIMAN DESSOUKI, SOLIMAN HAMZA, ABBAS EL ITRIBI, ABDEL HAMID IBRAHIM, proposés par Messieurs le Professeur H. PRIESNER et ANTOINE CASSAB ; Monsieur MARCEL BLANCHETEAU, de Paris, proposé par Messieurs le Professeur H. C. EFFLATOUN Bey et A. ALFIERI.

Délégués aux Congrès :

Monsieur MOHAMED SOLIMAN EL ZOHEIRY est désigné pour représenter la Société au VII^e CONGRÈS INTERNATIONAL D'ENTOMOLOGIE qui se tiendra à Berlin du 15 au 20 Août 1938.

Aux CONGRÈS ASSOCIÉS INTERNATIONAUX DE MÉDECINE TROPICALE ET DU PALUDISME (III^e Congrès), qui se tiendront à Amsterdam-Rotterdam en Septembre 1938, la Société sera représentée par Monsieur le Docteur SAADALLAH MOHAMED MADWAR.

Echange :

L'échange des publications est établi avec le TRANSVAAL MUSEUM, de Prétoria (Afrique du Sud).

Revisione delle Specie egiziane del Genere *Cerceris* Latr.

(Hymenoptera : Sphegidae-Philanthinae)

(con 15 Tavole)

per il Dott. ALBERTO MOCHI

AVVERTENZA

Il presente lavoro è il risultato dei miei sforzi per determinare le *Cerceris* che ho raccolte nel corso di cinque anni durante le mie gite nel deserto. Il territorio di caccia è stato strettamente limitato per il fatto che, date le mie occupazioni, non ho mai potuto spostarmi oltre certi limiti. Gli esemplari studiati provengono dunque principalmente dalle seguenti località :

Limiti fra culture e deserto : Mansurieh, Kerdassa, Guizeh, Saqqara, etc. ; Marg, Ezbet el Nakhl, Gebel Asfar, Khanka.

Deserto : Via di Suez, Oasi del Fayum, Wadi Abu Rawash, Wadi Hof, Wadi Digla ; più di rado Wadi Garawi, Bir Guendeli, Wadi Umm Assad.

Una sola volta ho potuto spingermi fino al Mariut, due volte fino al Sinaï.

Ho potuto studiare anche del materiale proveniente dal Sud del territorio egiziano, avendomi il Prof. H. Priesner gentilmente confidata la collezione delle *Cerceris* del Ministero di Agricoltura.

Anche nel tempo le mie raccolte sono state limitate : è scarsa, nella mia collezione, la fauna caratteristica dei mesi di Luglio, Agosto e Settembre, durante i quali o mi trovavo in Europa, oppure, anche essendo in Egitto, mi era impossibile dedicarmi alla cattura degli imenotteri, che non può farsi che dalle 10 antimeridiane alle 4 del pomeriggio. In quelle ore e in quella stagione correr dietro alle vespi nei punti più soleggiati del deserto equivale ad un tentativo di suicidio. Anche a questa lacuna ha provveduto la collezione del Ministero di Agricoltura, nella quale abbondano gli esemplari catturati in estate.

In compenso, ogni caccia è stata in generale molto fruttifera perchè eravamo regolarmente in quattro persone a raccogliere : io stesso, mia moglie, mio figlio e perfino il mio autista. Ho così potuto mettere insieme circa 350 esemplari di sole *Cerceris*.

Per la determinazione di questo materiale ho potuto ricorrer alla Bi-

blioteca della Reala Società entomologica d'Egitto, a quella dell'Istituto d'Egitto e a quella privata del Dott. A. Honoré, che mi ha permesso di consultare le numerose pubblicazioni che possiede. Ho così potuto leggere nell'originale i seguenti lavori:

Klug : Symbolae Physicae, 1829-45 (importante per le tavole);
Spinola : Ann. Soc. entom. France, 1838;
André : Hyménoptères d'Europe et d'Algérie, 1886;
Schletterer : Zoologische Jahrbücher, 1887 e 1889 (grande monografia delle *Cerceris* e appendice;
Kohl : Ann. der k.-k. naturh. Hofmuseum, Wien, 1896 (sui generi delle *Sphegidae*);
Dalla Torre : Catalogus, 1897;
Morice : Trans. entom. Soc. London, 1897 (fauna nord-africana);
Kohl : Ann. der k.-k. naturh. Hofmuseum, 1898 (nuove *Sphegidae*);
Kohl : Termesz. Füzet., 1898 (nuove *Sphegidae*);
Schulz : Hymenopteren-Studien, 1905;
Kohl : Denkschr. der Akad. d. Wiss. Wien, 1907 (fauna arabica);
Morice : Trans. entom. Soc. London, 1911 (fauna nord-africana);
Brauns : Ann. Transvaal Museum, 1926 (*Cerceris* del Sud Africa);
Arnold : Ann. Transvaal Museum, 1931 (appendice al lavoro del Brauns);
Zoological Record : fino al 1935 incluso.

Dei lavori più recenti non mi è stato possibile procacciarmi quelli dello Shestakov, trattanti principalmente delle *Cerceris* delle steppe russe, pubblicati per la maggior parte in russo nell'U.R.S.S.

L'esame della letteratura mi ha piuttosto servito per disorientarmi che per orientarmi. Praticamente, le sole descrizioni che veramente permettono una determinazione sicura sono quelle del Kohl e dello Schulz. Le più antiche, fondate principalmente sulla descrizione dei colori, non servono a nulla. Fra le più recenti quelle del Morice hanno il vantaggio della chiarezza e della concisione. Quanto al lavoro classico dello Schletterer, lo considero come una delusione. La mancanza completa di figure, la scelta infelice dei pochi caratteri la cui descrizione si ripete per ogni specie, lo rendono ben poco utile. Salvo per specie che presentano peculiarità notevoli, impossibile distinguere gli esemplari sulla base della descrizione delle sculture (più o meno fitte o grosse, più o meno superficiali o profonde) e di quella della pilosità che l'insetto perde regolarmente invecchiando.

Ho dunque potuto identificare 23 forme diverse nel mio materiale, di cui 19 rappresentate dai due sessi, ed altre 5 o 6 forme nel materiale del Ministero di Agricoltura. Queste ultime appartengono in gran parte alla fauna

del Gebel Elba, son rappresentate da pochi esemplari spesso non ben conservati e quindi richiedono uno studio ulteriore : ho dovuto lasciarle da parte. Su quelle della mia collezione ho dovuto rinunciare ad occuparmi di tre per le stesse ragioni : troppo poco materiale, rappresentato inoltre da un solo sesso. Restavano 20 specie. Di 13 soltanto mi è riuscito stabilire l'identificazione ; 7 non corrispondevano a nessuna delle descrizioni a me note. Se avessi voluto aspettare di fare il giro d'Europa per procurarmi la letteratura impossibile a trovare in Egitto o per confrontare i tipi nei diversi Musei non mi sarebbero bastati nè gli anni che mi restano a vivere nè il tempo che ho a disposizione. Ho dunque deciso di designare con nomi nuovi queste 7 forme, le quali si son potute poi raggruppare in 5 specie, due potendo esser considerate come varietà.

Temo di aver così contribuito ad aumentare la confusione derivante dalle sinonimie. Siccome però ho cercato di fornire delle descrizioni e delle documentazioni grafiche sufficienti per riconoscere senza dubbi possibili l'insetto che ho avuto sotto gli occhi, spero che il male non sarà troppo grave. Di sinonimi ve ne sono infiniti ; qualcheduno di più non fa gran male ; ma di buone descrizioni ce ne son ben poche ; aggiungerne qualcuna è certamente un vantaggio.

INTRODUZIONE

La famiglia delle *Philanthinae* comprende delle Sfegidi a 3 cellule cubitali, a tibie intermedie con una sola spina, ad antenne di 12 articoli nella ♀, di 13 nel ♂, palpi labiali di 4 articoli, mascellari di 6, ocelli rotondi, disposti a triangolo equilatero, di grandezza eguale, labbro coperto dal clipeo, sutura epicnemiale assente, cellula radiale delle ali anteriori non appendicolata, le due discoidali trasverse sboccanti respettivamente nella seconda e terza cellula cubitale, il clipeo dei ♂♂ fornito di una specie di barba sulle parti laterali.

A questa famiglia appartengono 3 generi che si distinguono per i seguenti caratteri :

Cerceris Latr. : Occhi non reniformi ; barba dei lati del clipeo dei ♂♂ mediocre ; guance assenti ; seconda cellula cubitale peziolata ; nervatura cubitale delle ali posteriori sorgente molto dopo la chiusura della cellula submediale ; area cordata del segmento mediano presente ; segmenti addominali strozzati l'uno per rapporto all'altro ; campo pigidiale presente nei due sessi.

Nectanebus Spin. : Seconda cellula cubitale non peziolata ; segmenti addominali meno strozzati ; del resto come *Cerceris*.

Philanthus F. : Occhi reniformi o no ; barba dei lati del clipeo dei ♂♂ molto sviluppata ; guance assenti o presenti ; seconda cellula cubitale non peziolata ; nervatura cubitale delle ali posteriori interstiziale, oppure sboccante nella cellula submediale o subito dopo la chiusura di questa ; area cordata del

segmento mediano assente; segmenti addominali non strozzati; campo pigidiale assente o presente.

Il genere *Cerceris*, ricchissimo di specie, è assai uniforme; non sembra che il tentativo per dividerlo in sottogeneri sia stato fruttifero, almeno per quanto riguarda la fauna paleartica. Il genere *Nectanebus*, rappresentato dalla sola specie *Fischeri* Spin. di Egitto, rappresenta un passaggio fra *Cerceris* e *Philanthus*; quest'ultimo genere è stato diviso in varii sottogeneri a seconda che gli occhi sono o no reniformi, l'area pigidiale assente o presente in uno o nei due sessi, la nervatura cubitale delle ali posteriori sorgente dentro o fuori la cellula submediale. Di questi sottogeneri uno (*Aphilanthops* Cameron) non sembra possedere caratteri tali da poter esser mantenuto; alla fauna paleartica appartengono solo *Philanthus* F. e *Philoponus* Kohl.

CERCERIS Latr.

Per la descrizione dei caratteri generici rinvio alle pubblicazioni del Kohl (1896) e dello Schletterer (1887). Il genere *Cerceris* è ricchissimo di caratteri, onde nelle descrizioni è indispensabile farne una cernita. L'Arnold (1931) ha osservato a ragione che gli autori meno recenti hanno scelto dei caratteri ambigui, d'importanza molto relativa. Le osservazioni che seguono riguardano solo le specie egiziane.

Il colore non ha che un interesse secondario. Senza dubbio, per varie specie esistono tipi di fasce e di macchie abbastanza costanti; ma altre volte la colorazione è uniforme mentre variano moltissimo i caratteri strutturali. Così, fra le specie egiziane, ve ne sono 9 (fra cui due varietà) che presentano il fondo giallo e macchie nere sul torace e sulla testa: la distribuzione di queste macchie varia moltissimo negli individui della stessa specie, e in tutte le specie secondo uno stesso tipo, per cui è assolutamente impossibile stabilire una diagnosi sulla base del colore. Altre 4 specie hanno fondo nero con macchie gialle o rosse distribuite in modo analogo. Ne restano dunque soltanto 5 nelle quali il colore e la distribuzione delle macchie permettono una diagnosi sicura. È da notare che tanto il colore giallo quanto il nero possono tendere a passare al rosso: così la ♀ di *capito* Lep. è generalmente rossa, ma se ne trovano esemplari gialli; in *pharaonum* Kohl l'addome è giallo ma può passare al rosso; nel ♂ di *erythrocephala* Dahlb. i tergiti passano dal giallo al rosso e al nero fino alla varietà *gynochroma* nov. che è tutta nera. D'altra parte in *tricolorata* Spin., *alboatra* Walk. e *Fischeri* Spin. il fondo nero passa al rosso cupo soprattutto all'addome; il peziolo è indifferentemente rosso o nero.

La nervatura alare, uniforme per il genere, non presenta alcun carattere utilizzabile per l'identificazione delle specie. Ha invece una certa importanza il tipo d'infumatura delle ali. In due specie (*erythrocephala* Dahlb. e *rutila*

Spin.) queste sono tutte annerite, nella prima col margine laterale, nella seconda col margine costale più scuro del resto; *capito* Lep. si distingue nei due sessi da tutte le altre specie egiziane per avere una macchia che comprende l'apice dell'ala anteriore, una stretta marginatura lungo il bordo laterale, la cellula radiale e la seconda e terza cubitale. Le altre specie si dividono in quattro gruppi: *sulcipyga* nov. spec., *Döderleini* Schulz e *lutea* Taschbg. hanno una larga fascia sul margine laterale delle ali anteriori e l'apice delle posteriori fortemente anneriti, che spiccano sul resto dell'ala; *Komarovi* Rad., *pharaonum* Kohl, *pulchella* Klug, *Priesneri* nov. spec. e *Honorei* nov. spec. presentano una macchia simile, ma molto più stretta e sfumata, mentre l'apice delle ali posteriori è jalino o appena oscurato; *pruinosa* Morice, *Alfierii* nov. spec., *lateriproducta* nov. spec., *pallidula* Morice, *albo-atra* Walk. e *Fischeri* Spin. portano soltanto una macchiolina all'apice delle ali anteriori, mentre il margine e il resto delle due ali sono jalini; *tricolorata* Spin. finalmente ha le ali tutte jaline, appena un pò più scure alla base che all'apice e al margine esterno. La subcosta è generalmente nera, lo stigma nero e concolore.

La scultura è disposta secondo uno schema che si ripete nelle varie specie: Alla testa più fitta e fina sul vertice e sull'occipite, generalmente lasciante spazii lisci nella regione degli ocelli, sparsa sul clipeo e sui lati della faccia dove è spesso coperta da pruinosità. Al torace è più grossa che sulla testa, ma meno fitta, sul dorsulo, più fina e sparsa sullo scutello, finissima e spesso assente sul postscutello. Il segmento mediano presenta caratteri peculiarissimi, fra i più importanti per la diagnosi specifica. Nonostante l'uniformità del tipo, per altro, la scultura della testa e del torace ha una certa importanza per la diagnosi come lo dimostrano gli schemi delle Tavole. Sul lato ventrale le mesopleure sono generalmente reticolato-puntate, le metapleure a strie trasversali; la scultura diviene più scarsa e superficiale sul meso e metasterno. All'addome generalmente il primo tergite ha punti più grossi e più radi dei seguenti; gli sterniti sono meno fittamente e più superficialmente scolpiti. Importanza diagnostica hanno la spinula che talora si trova all'angolo latero-inferiore del pronoto, quella che si può presentare più o meno sviluppata al mezzo del margine laterale delle mesopleure (quasi sempre solo nelle ♀♀), il rilievo che qualche volta esiste alla base del secondo sternite. La forma di quest'ultimo non è priva di importanza. Così, per esempio, per due specie vicinissime e spesso molto difficili a distinguere specialmente nel sesso ♂, come *pulchella* Klug e *pallidula* Morice, il miglior carattere differenziale è la forma del rilievo sul secondo sternite, appiattito, largo, quadrangolare nella prima, ridotto ad un piccolissimo triangolino nella seconda.

Alla testa il clipeo presenta differenze notevolissime e di grande importanza diagnostica nella ♀, è invece di tipo uniforme nei ♂♂. Fra questi ultimi soltanto *Döderleini* Schulz ha il clipeo di forma specialissima, suffi-

ciente per identificare la specie. I margini oculari sono paralleli o un poco divergenti verso il clipeo. La distanza degli ocelli fra loro è in generale eguale a quella fra ciascun ocello e il margine oculare corrispondente. L'inserzione delle antenne avviene più o meno distante dal margine superiore del clipeo, come lo mostrano le figure delle Tavole. In alcune specie gli articoli terminali delle antenne sono conformati in modo caratteristico nei ♂♂. I rapporti di lunghezza fra il 1°, 2° e 3° articolo del funicolo sono in generale assai costanti: come 1 a 2 e a 1,5 ; variano però in qualche caso e allora possono servire per la diagnosi.

D'accordo con l'Arnold ritengo che i peli del corpo in generale e del pigidio in particolare rappresentino un carattere di pochissimo valore, in quanto cadono facilmente durante la vita dell'animale. Il campo pigidiale ha conformazioni varie nella ♀, mentre è di tipo relativamente costante nei ♂♂. Il numero delle spine del pettine dei tarsi anteriori e di quelle che si trovano al margine laterale della tibia posteriore ha una certa importanza ; devo però osservare che non è costante nella stessa specie e spesso varia leggermente da un lato all'altro anche nello stesso individuo.

Vorrei qui portar l'attenzione sopra alcuni caratteri che non mi risulta siano stati ancora presi in considerazione e che mi sembra presentino un certo interesse per la differenziazione delle specie:

1°. *Apparecchio di toelette delle tibie anteriori.* — Questo non presenta sempre la stessa forma. Il prolungamento che sostiene la lamina trasparente varia moltissimo di lunghezza nelle varie specie e questa differenza è costante nei due sessi: se ne possono distinguere cinque tipi: lunghissimo (*sulcipyga* nov. spec.), lungo (*lutea* Taschbg., etc.), medio, breve e brevissimo (*alboatra* Walk.). La distribuzione dei peli lungo il prolungamento è varia nei vari tipi, come dimostrano le figure 19-22 della Tavola IX.

2°. *Rapporti di lunghezza delle tibie e dei tarsi.* — Se si misurano le tibie e i tarsi corrispondenti si trova che in generale la tibia rappresenta dal 35 al 40 % della lunghezza totale. In tre specie (*sulcipyga* nov. spec., *lutea* Taschbg., *pharaonum* Kohl) questo rapporto è alterato: la tibia è lunga quanto l'insieme dei tarsi corrispondenti o poco meno.

3°. *Apofisi dell'ultimo sternite visibile della* ♀. — L'ultimo sternite visibile porta nella ♀ due o quattro apofisi, spesso confuse fra i peli, fra le quali sporge l'aculeo, appoggiate sulla faccia ventrale del campo pigidiale, che presentano forma e aspetto caratteristici per ciascuna specie. Mi sembra che lo studio di queste apofisi (che probabilmente esercitano una qualche funzione per la copula) sia così importante nella ♀ come lo studio dei genitali nel ♂ ; né trovo che gli autori se ne siano finora occupati.

Ho cercato di figurare la maggior parte dei caratteri descritti. Le figure sono state disegnate con la camera lucida al microscopio binoculare Leitz.

Gli acquerelli servono per dare un'idea dell'aspetto generale e del colore delle varie specie. Spesso mettono in evidenza il notevole dimorfismo sessuale caratteristico di molte *Cerceris*.

Tavole per la determinazione delle specie egiziane

♀♀

1. Parte media del clipeo con una sporgenza appiattita, a bordo libero rivolto in avanti e in basso, grosso, arcuato. Ali completamente infumate. La più grande fra le specie egiziane .... *C. erythrocephala* Dahlb.

—. Parte media del clipeo con una sporgenza conica, ad apice smusso, rivolto nettamente in basso. Ali leggermente infumate con una striscia più scura lungo il margine costale e su parte del margine laterale. Statura media... .... *C. rutila* Spin.

—. Parte media del clipeo senza sporgenza libera. Ali mai tutte infumate .. 2

2. Campo pigidiale longitudinalmente striato, lucente. Colore rosso e nero. .... *C. sulcipyga* nov. spec.

—. Campo pigidiale non longitudinalmente striato 3

3. Il penultimo segmento ventrale con un'infossatura mediana limitata distalmente da un rilievo tagliente 4

—. Manca il detto incavo 5

4. Rilievo basale sul 2° sternite presente .... *C. tricolarata* Spin.

—. Rilievo basale sul 2° sternite assente .... *C. alboatra* Walk. (inedita)

5. I tergiti presentano al margine latero-posteriore una leggera sporgenza 6

—. Manca la detta sporgenza 7

6. Colore nero, disegni gialli e rossi .... *C. lateriproducta* nov. spec.

—. Colore prevalentemente giallo .... *C. lateriproducta* var. *flava* nova

7. Un prolungamento a uncino rivolto indietro al lato postero-inferiore delle tempie .... *C. Komarovi* Rad.

—. Manca il detto uncino 8

8. Corpo lucido, puntuazione finissima. Parte media del clipeo prolungata in basso a forma di rilievo conico non staccato .... *C. Döderleini* Schulz (inedita)

—. Scultura più grossa, clipeo altrimenti conformato 9

9. Rilievo sulla base del secondo sternite addominale assente 10

—. Rilievo sulla base del secondo sternite addominale bene sviluppato .. 12

—. Rilievo sulla base del secondo sternite addominale ridotto ad una sottile striscia trasversale appena visibile. Colore prevalentemente giallo. .... *C. pallidula* Morice

10. I tarsi cortissimi, presi insieme di poco più lunghi della tibia corrispondente. Colore giallo o l'addome appena rossastro 11

—. I tarsi normalmente sviluppati 12

11. Statura media; campo pigidiale grandissimo, subrettangolare; margini alari fortemente infumati; collare senza rilievi .... *C. lutea* Taschbg.

—. Statura piccola; campo pigidiale trapezoidale, non eccessivamente grande; ali con macchia apicale; collare con un rilievo spiniforme ai lati .. .. *C. pharaonum* Kohl

12. Statura grande, di poco inferiore a quella di *erythrocephala* Dahlb.; testa molto sviluppata trasversalmente; colore spesso rosso... *C. capito* Lep.

—. Statura generalmente non superiore ai 12 mm.; testa normale; colore mai rosso 13

13. Colore prevalentemente giallo 14

—. Colore nero a disegni gialli o rossi 17

14. Parte media del clipeo col margine distale larghissimo, inarcata a mezzaluna con la concavità in basso .... *C. pruinosa* Morice

—. Il clipeo diversamente conformato 15

15. Scultura specialmente fitta e profonda; anche anteriori coniche, con punti profondi ed evidenti .... *C. Alfierii* nov. spec.

—. Scultura meno profonda; le anche anteriori non coniche e non punteggiate 16

16. La parte media del clipeo leggermente concava sui suoi due terzi inferiori. Il 2° articolo del funicolo appena più lungo del 1° .... *C. pulchella* Klug

—. La parte media del clipeo con una leggera sporgenza a piramide sulla sua parte inferiore. Il 2° articolo del funicolo due volte più lungo del 1°. .... *C. Priesneri* nov. spec.

17. Caratteri come al numero 15 .... *C. Alfierii* var. *picta* nova

—. Mancano i detti caratteri 18

18. Area cordata liscia, eccessivamente allungata e stretta, la sua altezza di circa un terzo maggiore della base .... *C. Honorei* nov. spec.

—. Area cordata liscia, di forma ordinaria, divisa al mezzo da un leggero solco (le parti prossimiori del segmento mediano lisce, con pochissimi punti sparsi) .... *C. Fischeri* Spin.

♂♂

1. Il clipeo convesso nella parte superiore, con una forte carena longitudinale mediana nella parte inferiore, fino al margine .... *C. Döderleini* Schulz

—. Il clipeo altrimenti conformato 2

2. Il metatarso intermedio nettamente incurvato .... *C. capito* Lep.

—. Il metatarso intermedio non incurvato 3

3. Il margine della parte prossimale del quinto sternite inciso a semiluna con la concavità rivolta distalmente .... *C. Komarovi* Rad.

—. Manca la detta incisura 4

4. Il peziolo assai più lungo dell'ordinario; l'area cordata con non più di 6 o 7 grossi solchi longitudinali .... *C. alboatra* Walk.

—. Peziolo ordinario, area cordata altrimenti scolpita 5

5. I tergiti presentano al margine latero-posteriore una leggera sporgenza 6

—. Manca la detta sporgenza 7

6. Testa e torace neri a disegni gialli, addome giallo con tutti i tergiti fasciati di nero distalmente .... *C. lateriproducta* nov. spec.

—. Colore prevalentemente giallo .... *C. lateriproducta* var. *flava* nova

7. Tarsi relativamente corti, presi insieme appena più lunghi della tibia corrispondente. Campo pigidiale con la base prossimale nettamente maggiore della distale, trapezoidale 8

—. Tarsi ordinari, campo pigidiale non trapezoidale 10

8. Statura grande. Testa e torace neri con pochi disegni rossi, addome rosso. Zampe più spinose che in qualsiasi altro ♂ egiziano .... *C. sulcipyga* nov. spec.

—. Statura media o piccola. Colore prevalentemente giallo. Zampe meno spinose 9

9. Ali fortemente infumate al margine laterale. Collare senza rilievi .... *C. lutea* Taschbg.

—. Ali soltanto infumate all'apice. Collare con una spina a ciascun lato .. .. *C. pharaonum* Kohl

10. Ali leggermente infumate in toto 11

—. Ali jaline o solo infumate al margine o all'apice 13

11. La parte dell'ala anteriore che corre lungo la costa e una parte soltanto del margine laterale oscurati per rapporto al resto. Statura media. Clipeo convesso .... *C. rutila* Spin. (inedita)

—. Il margine laterale delle due ali molto oscurato per rapporto al resto. Statura grande. Clipeo lievemente concavo in basso con una macchietta al mezzo dell'incavo 12

12. Torace e testa neri a scarsi disegni gialli o rossi, addome con peziolo nero o rosso, gli altri tergiti gialli con il margine distale sottilmente fasciato di nero .... *C. erythrocephala* Dahlb.

—. Testa, torace e addome neri .... *C. erythrocephala* var. *gynochroma* nova

—. Addome nero variamente macchiato di giallo o rosso .... *C. erythrocephala* (transitiones)

13. Rilievo alla base del secondo sternite piccolissimo, triangolare. Colore prevalentemente giallo .... *C. pallidula* Morice

—. Rilievo sulla base del secondo sternite bene sviluppato 14

14. Colore prevalentemente giallo 15

—. Colore nero a disegni gialli o rossi 18

15. Scultura forte, le anche anteriori coniche fortemente punteggiate .... *C. Alfierii* nov. spec.

—. Scultura meno profonda e forte, anche anteriori non coniche o non punteggiate 16

16. Il secondo articolo del funicolo lungo almeno due volte il primo .... *C. Priesneri* nov. spec.

—. Il secondo articolo del funicolo appena più lungo del primo 17

17. Area cordata liscia, lucente .... *C. pulchella* Klug

—. Area cordata punteggiata almeno sulla sua metà distale, opaca .... *C. pruinosa* Morice

18. Scultura e anche anteriori come al n° 15 .... *C. Alfierii* var. *picta* nova

—. Mancano i detti caratteri 19

19. Area cordata liscia, lucentissima, non divisa longitudinalmente da un solco .... *C. tricolorata* Spin.

—. Area cordata divisa longitudinalmente 20

20. Anche anteriori coniche. Le parti che circondano l'area cordata lisce, con punti scarsissimi .... *C. Fischeri* Spin.

—. Anche anteriori ordinarie. Le parti che circondano l'area cordata appena meno fittamente scolpite del resto del propodeo ...... *C. Klugi* Schlett.

1. — C. erythrocephala Dahlb.

Il Kohl, che ha ritrovata questa specie nell'Arabia meridionale, ha potuto costatare, controllando i tipi, che la descrizione dello Schletterer si riferisce ad una *Cerceris* differente da quella descritta dal Dahlbom, prossima a *prisca* Schlett. ed a *capito* Lep. Ha inoltre stabilito per il primo che il ♂ di *erythrocephala* Dahlb. è identico alla specie descritta col nome di *selifera* dallo Schletterer.

♀. — La più grande delle specie egiziane. Statura assai variabile: il più grande dei miei esemplari misura 30 mm., il più piccolo 19 mm. Gli esemplari piccoli sono meno frequenti. La figura 1 ♀ (Tavola I) mostra i colori di un esemplare catturato in estate. Al lato ventrale tendono al rossastro i trocanteri, specialmente quelli del 1° paio, e il 1° e 2° sternite. Alla faccia sono rossi il clipeo, eccetto il margine anteriore del processo nasiforme che è nero, i lati fin verso i 3/4 superiori degli occhi e la carena interantennare. È nera la regione degli ocelli, cui fanno seguito spazi dello stesso colore ai lati fino al margine oculare e in basso fino all'inserzione antennare. In autunno ho raccolti esemplari nei quali il color rosso è molto più esteso sul torace. Nel più chiaro sono rossi tutta la testa, il torace e il peziolo; neri la punta e il margine interno delle mandibole, le antenne a partire dell 8° articolo, il pro e mesosterno, le mesopleure, sfumature sul margine anteriore e i lati del dorsulo e l'addome; le zampe sono tutte rosse compreso le anche delle tre paia, meno le tibie posteriori, fortemente annerite. Posseggo cinque esemplari catturati a Khartum nei quali la colorazione corrisponde a quella ora descritta, par cui sembra probabile che la maggiore abbondanza delle parti rosse sia in rapporto col maggior calore cui è stata sottoposta la larva nel periodo dello sviluppo.

I margini degli occhi sono quasi paralleli (la distanza all'altezza dell'ocello anteriore sta alla distanza massima al clipeo come 30 a 33). La distanza

degli ocelli posteriori fra loro (da centro a centro) è eguale a quella dal centro di ogni ocello al margine dell'occhio corrispondente. Le mandibole sono molto sviluppate, munite di due forti denti al margine mediale e molto ricche di peli sia medialmente che lateralmente. La parte media del clipeo porta una sporgenza nasiforme, spessa, col margine anteriore grosso, tagliato obliquamente, arcuato, terminato ai lati da due tubercoli; sotto a questa sporgenza si trova un profondo incavo a margine anteriore profondamente arcuato, concavo, riccamente provvisto di lunghi peli, terminato da un tubercolo sui lati dove inizia il margine delle parti laterali. Queste sono quasi del tutto piane, a margine convesso, subopache per la presenza di puntuazione microscopica con pochi punti grandi superficiali. I lati della faccia sono leggermente convessi. La carena interantennare non è tagliente come nella maggior parte delle *Cerceris*, ma arrotondata: supera di poco in alto l'inserzione antennare e si continua sotto forma di sottil listerella che si eleva sopra una specie di tetto pianeggiante e raggiunge l'ocello anteriore. Occipite e tempie molto sviluppati: la distanza fra il centro dell'ocello anteriore e il punto dove l'occipite s'inflette indietro (in proiezione superiore) è la metà della distanza interoculare all'altezza dell'ocello anteriore. Le antenne sono quasi rigorosamente cilindriche. La scultura della testa è assai omogenea: consta di una puntuazione microscopica fitta che dà al fondo un aspetto opaco con punti macroscopici piuttosto superficiali, staccati, non confluenti, meno fitti e meno grandi sul clipeo e sul processo nasiforme che sull'occipite e sulle tempie.

Il collare è leggermente infossato al mezzo, con due piccoli rilievi arrotondati alle spalle. La massima larghezza del dorsulo (a livello del margine superiore delle scagliette) sta alla massima lunghezza al mezzo come 45 sta a 30. La scultura di queste due parti è analoga a quella della testa. Le scagliette, piccole e ovalari, presentano una microscultura a reticolazione regolare, con 3 o 4 punti grossi, superficiali, e appaiono meno opache del dorsulo. Lo scutello è pianeggiante, appena un po' infossato longitudinalmente al mezzo, il postscutello convesso; entrambi portano una microscultura irregolare, punteggiato-rugosa, e scarsissimi punti superficiali sparsi. L'area cordata del segmento mediano è finissimamente trasversalmente striata (in alcuni esemplari le strie divengono talmente piccole da poter esser considrate come formanti microscultura reticolato-striata), con solco longitudinale mediano; le parti immediatamente adiacenti portano una microscultura reticolata regolare con grossi punti profondi e fitti; anteriormente e sui lati i punti divengono molto più piccoli.

Le zampe sono fortemente scolpite a strie-rughe e punti, riccamente armate di peli e spine. Pettine del metatarso anteriore a 8 spine, forte, di media lunghezza. Rapporti di lunghezza della tibia e dei 5 tarsi posteriori eguali a: 45-25-10-8-5-10. L'articolo ungueale relativamente corto. Unghie corte, pulvilli bene sviluppati. Il numero delle spine al margine laterale delle

tibie posteriori non è costante: alcuni esemplari ne portano 6, altri 7. La faccia latero-ventrale di questo paio di tibie presenta una scanalatura marginata da due file di spine. I femori anteriori e intermedi presentano una frangia di corte ciglia curve al margine ventrale.

I segmenti addominali sono relativamente poco strozzati l'uno per rapporto all'altro, salvo il primo, pezioliforme, di circa il doppio più largo che lungo, largo all'estremo distale la metà circa della larghezza del secondo a questo estremo. Tutti i tergiti portano una microscultura di fondo reticolata: sul primo (peziolo) i punti sono grossi e fitti quasi come sul propodeo presso l'area cordata, sui seguenti sono sparsi (spazi eguali a 2-3 volte e più il diametro del punto), superficiali, di grandezza variabile, più piccoli in media che sul peziolo. Nell'insieme l'addome è più lucente della testa e del torace. Il campo pigidiale è grande, piriforme, a margini rilevati e superficie piana, con l'estremo distale leggermente concavo e porta una scultura grossolana striato-rugosa su microscultura di fondo irregolarmente rugosa; le grosse rughe diminuiscono di grossezza verso l'estremo distale, dove la microscultura resta quasi sola. I lati, la parte ventrale e l'estremità sono rivestiti di peli rigidi assai lunghi che formano pennello sui lati del penultimo segmento ventrale.

Le mesopleure e il mesosterno sono puntato-rugosi a punti piccoli, fitti e profondi. Le mesopleure portano una piccola sporgenza dentiforme. Ventralmente il primo segmento addominale porta sola microscultura a strie longitudinali, il 2°, sprovvisto di rilievo basale, è tutto punteggiato a punti staccati, irregolari, mediocri, assai profondi, su una microscultura di fondo irregolarmente striata, il 3°, 4° e 5° portano punti eguali a quelli del 2°; l'ultimo sternite visibile, è piano con sola microscultura e porta su ciascun lato una doppia apofisi quasi coperta da un ciuffo abbondante di peli; l'incavo mediano è profondo. I segmenti sono forniti di peli rigidi, molto più abbondanti sul 4° e 5° specialmente al margine distale e sui lati. Tutto il corpo porta pelurie biancastra variamente distribuita, facilmente staccabile (poco visibile negli esemplari vecchi).

♂. — Descritto sommariamente col nome di *selifera* dallo Schletterer, ne abbiamo una descrizione più accurata del Kohl. È talmente diverso dalla ♀ che non c'è da meravigliarsi se l'identità specifica non è stata subito riconosciuta.

Il maggiore esemplare della mia collezione è lungo 20 mm., il più piccolo 14 mm. Colore variabilissimo. Gli esemplari più comuni corrispondono alla figura 1 ♂ (Tavola I). Alla faccia sono gialli la base e il margine esterno delle mandibole sui 2/3 prossimali, il clipeo e la faccia fino all'altezza dell'inserzione antennare e 3 strisce, una centrale fino all'ocello anteriore, due laterali lungo il margine oculare, fino all'altezza del detto ocello, talora una macchiolina dietro l'occhio al limite fra l'occipite e le tempie. Al torace varia un poco l'estensione del color rosso sul collare, lo scutello e il post-

scutello (in un esemplare questi due ultimi sono gialli) ma la colorazione dell'avancorpo è in genere assai costante. Dal lato ventrale il torace è tutto nero; all'addome invece gli sterniti tendono al rosso e spesso i due primi sono molto chiari. All'addome il 1° tergite è in alcuni esemplari tutto rosso-ruggine, in altri rosso con la base nera, in altri tutto nero. Accanto a questa forma se ne trovano numerose altre. In un unico esemplare il colore della faccia è normale, al torace lo scutello è tutto nero, all'addome il peziolo è nero, il 2°, 3° e 4° tergite sono giallo-dorato quasi in totalità, gli ultimi 3, compreso il campo pigidiale, nerissimi, picei, più lucenti delle altre parti nere. In altri esemplari il peziolo è tutto rossastro e, per quanto riguarda i tergiti dal 2° al 5°, si possono disporre gli esemplari in una serie nella quale tutti e 4 questi tergiti, o i primi 3, o i primi 2 o il primo soltanto portano fasce trasversali rosse sfumate o sono tutti rossi. In un esemplare il peziolo è nero, il 2° a 5° tergite a sfumature rosse; in alcuni altri il solo peziolo è rosso, tutti gli altri tergiti neri; altri infine sono tutti neri o quasi. Nei più scuri si hanno solo sfumature rosse ai lati del collare, al post-scutello, talora sul peziolo. Le scagliette sono sempre rosse, però qualche volta molto scure. Dal lato ventrale persiste la tendenza all'arrossamento dei primi sterniti. Le zampe si mantengono rosse salvo la base delle anche, l'apice dei femori intermedi e posteriori e le tibie e tarsi posteriori che possono esser tutti neri. Negli esemplari scuri il colore delle parti chiare della faccia varia dal giallo-oro al rosso-ruggine. Costante rimane il colore delle antenne che hanno color ruggine i primi 5 articoli e l'apice dell'ultimo e nero il resto. Le ali dei maschi sono più chiare di quelle delle femmine, il più scuro dei maschi ha però ali quasi così scure come la più chiara delle femmine. Non ricordo di aver catturati esemplari scuri in autunno. Posseggo 7 individui del Sudan che hanno tutti la colorazione ordinaria, con l'addome giallo. Propongo di distinguere col nome di *gynochroma* nov. var. gli esemplari tutti neri.

La distanza dei margini oculari all'altezza dell'ocello anteriore sta alla massima distanza al clipeo come 18 sta a 21. La distanza dei due ocelli posteriori fra loro sta a quella di ciascun ocello dal margine oculare corrispondente come 8 sta a 6. Le mandibole, molto meno sviluppate che nella ♀, hanno il margine mediale sprovvisto di denti. Il clipeo è molto allungato. La parte media ha il margine anteriore arcuato, non dentato, assai più sporgente di quello delle parti laterali; la sua massima lunghezza al mezzo sta alla massima larghezza nel punto dove sorgono le suture che separano le parti laterali dai lati della faccia come 16 sta a 12: il valore corrispondente all'apice è 10. Questa parte è nell'insieme convessa, più nella porzione prossimale, con un leggero incavo longitudinale al mezzo della porzione distale, limitato inferiormente da una macchietta semitriangolare trasversale rossastra; nella sua parte più larga è di tre volte maggiore che la sua distanza dal margine oculare; le parti laterali sono strette, hanno il margine libero leggermente

convesso e vi portano una frangia di peli semi-agglutinati. La carena interantennare è tagliente, piccola, quindi molto diversa da quella delle ♀♀. Occipite e tempie molto meno sviluppati che nell'altro sesso, la testa dal disopra meno quadrangolare. La scultura della testa è assai omogenea, più grossa e più fitta che nella ♀, distribuita come in questa. Le antenne hanno lo scapo assai più corto che nella ♀ e sono leggermente clavate : la larghezza del 2° articolo del funicolo all'estremo distale sta a quella del penultimo all'estremo prossimale come 5 sta a 7. Per la forma dei due ultimi articoli si veda la figura 1, Tavola XIV.

Il collare e le varie parti del torace somigliano per forma a quelle della ♀, solo la scultura ne è più fitta. L'area cordata è anche più finemente striata che nell'altro sesso. Le zampe, meno spinose che nella ♀ e meno sviluppate, non presentano speciali caratteri. Scagliette come nella ♀.

La scultura dei tergiti addominali è notevolmente più fitta che nella ♀, pur presentando le stesse caratteristiche (microscultura di fondo). I tergiti sono nell'insieme più opachi, ciò che risulta chiaramente paragonando una ♀ e un ♂ con l'addome neri. Il campo pigidiale è piuttosto trapezoidale, coi bordi un pò rilevati, pianeggiante : la scultura consiste in una punteggiatura fitta quasi microscopica con infossature confluenti senza limiti netti, assai grandi.

Gli sterniti del torace e le pleure sono scolpiti come nella ♀, solo manca il dente alle mesopleure. Gli sterniti addominali, dal 2° in poi, sono incavati ad angolo ottuso e portano punti grossi, superficiali, ravvicinati, senza microscultura di fondo.

Pilosità sviluppata su tutto il corpo più che nella ♀ : ricchi peli biancastri eretti e in parte giacenti, quasi a tomento, sulla testa e sul torace, setole rigide numerose sugli sterniti addominali, specialmente ai loro margini distali, frange del pigidio bene sviluppate.

Questo ♂, come osserva il Kohl, presenta notevoli affinità con quello di *tubercolata* Rossi specialmente per i caratteri del clipeo, dell'area cordata e della scultura. Ne differisce per il colore, par il collare rilevato sui lati, per il metatarso intermedio retto, etc.

Specie piuttosto etiopica, si incontra fine al Sudan. Frequente ovunque nei dintorni del Cairo dall'Aprile al Novembre.

2. — C. capito Lep.

♀. — Lunghezza 16-20 mm. — Gli esemplari più comuni hanno il colore di fondo rosso come nella figura 2 ♀ (Tavola I), si trovano però anche esemplari col colore di fondo giallo oro. La distribuzione delle macchie nere sul torace e sulla testa è abbastanza costante ; in quelche esemplare il segmento mediano è più annerito sia sull'area cordata che sui lati. Alla faccia

gli ocelli si trovano su di una macchia nera che si prolunga in due strisce ai lati della carena interantennare fino all'inserzione delle antenne; la carena resta chiara. Le mandibole hanno la punta nera. Calli omerali e una larga macchia subalare sulle mesopleure, chiari; il resto delle mesopleure e le metapleure neri; altrimenti i lati e la parte ventrale del torace chiari. Anche i trocanteri chiari. Sterniti addominali egualmente del colore fondamentale.

I margini oculari sono assai divergenti: la loro distanza all'altezza dell'ocello anteriore sta alla massima distanza al clipeo come 27 sta a 32. Gli ocelli sono disposti a triangolo equilatero, molta ravvicinati fra loro: la distanza fra i due ocelli posteriori sta a quella fra ciascun ocello e il margine oculare corrispondente come 6 sta a 10. Le mandibole, mediocri, hanno il margine mediale non dentato, leggermente sinuoso, tagliente e son fornite di peli scarsi e corti. La parte media del clipeo è poco più larga delle parti laterali: il suo diametro trasverso massimo sta alla distanza dal margine oculare come 12 sta a 10. È lunga quaunto larga, assai convessa, col margine distale non sporgente, leggermente convesso, portante un rilievo mediano a tubercolo quasi piramidale; è in gran parte liscia, con pochi piccoli punti superficiali molto sparsi, lascianti fra loro larghissime zone libere. Le parti laterali, molto più larghe che alte, sono del tutto prive di punti e portano al margine distale una fitta frangia di corti peli argentei. Lati della faccia pianeggianti, larghi, con punti più grandi di quelli del clipeo, più profondi, più fitti, che raffittiscono verso l'alto tendendo a disporsi in file (scultura puntato-striata). La carena interantennare è arrotondata, benché meno che in *erythrocephala* Dahlb., e poco sopra l'inserzione antennare si divide in due branche che terminano ai due lati dell'ocello anteriore. Occipite e tempie bene sviluppati, ma meno che in *erythrocephala* Dahlb. La scultura perde quivi la tendenza a disporsi a strie. Le antenne cilindriche. Il diametro trasverso della testa nel suo insieme è maggiore di quello del torace, la testa appare grande, un po' schiacciata nel senso antero-posteriore.

Il collare è pianeggiante, appena un po' infossato al mezzo, con due piccolissimi rilievi alle spalle posteriormente. La scultura somiglia a quella del vertice. Il pronoto al davanti del collare (visibile solo se la testa è fortemente flessa in avanti) presenta strie arcuate parallele che si riuniscono al mezzo formando archi continui, concentrici, a concavità anteriore, progressivamente più ampi dall'avanti all'indietro. Il massimo diametro trasverso del dorsulo all'altezza del margine anteriore delle scagliette sta alla massima lunghezza al mezzo come 32 sta a 24. Il dorsulo è punteggiato, con spazi di poco maggiori del diametro dei punti che tendono a disporsi a strie. Scutello pianeggiante, postscutello poco convesso, entrambi assai punteggiati coi punti della stessa grandezza di quelli del dorsulo, ma meno fitti. Su tutta questa parte del torace e sulla testa manca microscultura di fondo, gli spazi fra i punti sono lisci e lucenti. L'area cordata, regolarmente triangolare, è divisa

in due da un solco largo; nella parte antero-mediale porta una scultura di fondo a microstrie longitudinali fitte situate su di uno spazio triangolare subopaco limitato da grossi punti che si riuniscono a strie grossolane parallele decorrenti obliquamente dal mezzo verso i lati e dall'alto verso il basso: all'apice i punti scompaiono e restano grosse strie parallele che si incontrano al mezzo angolarmente traversando anche il solco mediano. I lati del propodeo presentano una scultura profonda puntato-striata, piuttosto fitta e irregolare, su microscultura di fondo striato-rugosa.

Le zampe sono forti e tozze, non molto ricche in peli e spine. Il pettine del metatarso anteriore porta 5 spine oltre la piccola basale e le due apicali, grosse ma piuttosto corte. I femori non hanno frangia ventrale di peli. Unghie discrete, pulvilli mediocri. Rapporti di lunghezza della tibia e dei tarsi posteriori: 36-20-9-7-4-9. Scagliette piccole, ovali, molto lucenti.

Il peziolo è più largo che lungo: il suo diametro trasverso all'estremo distale sta a quello del segmento seguente come 22 sta a 37. I tergiti sono poco convessi e portano punti di media grandezza, eguali, regolari, staccati, vicini, gli spazi eguali o inferiori al diametro del punto, con una microscultura di fondo reticolata regolare. Il campo pigidiale è grande, allungato, romboidale, coi margini poco rialzati, pianeggianti, muniti di fitti peli curvi verso l'interno sui lati, con pennelli corti all'apice, portante una microscultura di fondo puntato-rugosa e strie irregolari grosse, ma meno che in *erythrocephala* Dahlb.

Le mesopleure sono reticolato-puntate a punti grossi e profondi, confluenti e portano due spine assai spiccate al loro margine ventrale, l'anteriore più piccola della posteriore. Il mesosterno è appena leggermente convesso, senza microscultura, con scarsissimi punti al confine con le mesopleure, del resto tutto liscio e lucente. Anche gli altri sterniti del torace sono lisci e lucenti; il metasterno porta al mezzo un'infossatura rotonda, crateriforme, quasi ombilicata, molto ben visibile.

Gli sterniti addominali, inflessi prossimalmente ad angolo ottuso, portano una microscultura reticolata regolare e scarsi punti superficiali. Il 2° sternite manca di rilievo alla base; l'ultimo visibile porta due lunghe apofisi fra le quali sporge la guaina dell'aculeo. Il corpo è quasi glabro; sul 4° e 5° sternite si osservano peli rigidi, più abbondanti al margine distale e sui lati che si continuano anche sul margine distale del penultimo tergite. Sugli ultimi tergiti inoltre si inseriscono i pennelli e le frange laterali caratteristiche del genere.

♂. — Lunghezza 13-19 mm. — Per quanto riguarda il colore, esistono esemplari che hanno la testa e il torace più scuri e più chiari di quello figurato (Tavola I, fig. 2 ♂). Nell'esemplare più scuro restano gialle soltanto due macchie sui lati del collare e le scagliette, nel più chiaro quasi tutta la testa è gialla meno un anello nero sfumato che include gli ocelli posteriori

e si chiude dietro di loro sull'occipite e al torace sono nere soltanto delle sfumature sui lati e al mezzo del dorsulo. Negli esemplari ordinari la faccia è tutta gialla fino all'ocello anteriore; gli apici delle mandibole son neri; gialli sono i calli omerali, la parte anteriore delle mesopleure e del mesosterno, i lati del propodeo e tutto il ventre. Le zampe sono tutte gialle. Nell'esemplare più scuro il torace è tutto nero anche sui lati e ventralmente, nel più chiaro invece è tutto giallo meno le metapleure. All'addome il colore non varia, solo le sottili strie all'estremo distale dei tergiti passano dal rosso al nero, senza mutare di grandezza. Il colore delle antenne è costante.

La faccia è molto più stretta che nella ♀. La distanza fra i margini oculari all'altezza dell'ocello anteriore sta alla massima distanza al clipeo come 17 sta a 25. Gli ocelli sono appena più distanti fra loro che dall'occhio (rapporto come 6 a 5). Mandibole simili a quelle della ♀, ma meno grandi. La parte media del clipeo è allungata (la massima lunghezza sta alla massima larghezza come 14 sta a 11) convessa sui 3/4 superiori, pianeggiante inferiormente e porta punti piccoli, staccati, irregolarmente disposti, lascianti larghi spazi liberi, ma molto più fitti che nella ♀. Il diametro massimo della parte media del clipeo sta alla distanza dall'occhio comme 11 sta a 6. Le parti laterali sono più alte che larghe, pianeggianti, col margine distale quasi retto portante la solita frangia di peli agglutinati, la scultura è eguale a quella della parte media. Lati della faccia quasi pianeggianti, con scultura più regolare che sul clipeo che diviene più fitta, quasi confluente sul vertice, l'occipite e le tempie: queste parti bene sviluppate. Carena interantennare ordinaria. Antenne ingrossate verso l'apice: il diametro del 2° articolo del funicolo all'estremo distale sta a quello del penultimo all'estremo prossimale come 5 a 7. Per la forma degli ultimi articoli vedasi la figura 2, Tavola XIV. Il diametro trasverso della testa non è sensibilmente superiore a quello del torace, la testa è meno schiacciata dall'avanti all'indietro che nella femmina.

Il torace non differisce sensibilmente da quello della ♀ per forma e scultura, anche la scultura dell'area cordata è identica.

Zampe meno sviluppate e meno spinose che nell'altro sesso. Il metatarso intermedio è curvato in modo caratteristico. La colorazione delle ali è identica a quella della ♀ : si noti sopratutto la macchia nella cellula radiale e nella seconda e terza cubitale che permette di distinguere subito i ♂♂ di questa specie da quelli di altre somiglianti.

I tergiti portano piccoli incavi longitudinali al mezzo del margine distale che diminuiscono di grandezza dal primo al 5°. La scultura è molto più fitta che nella ♀, i punti sono a contatto fra loro: microscultura di base identica. Campo pigidiale rettangolare col margine distale convesso, a bordi appena rialzati, quasi glabri, pianeggiante, ondulato per la presenza di numerose infossature irregolari puntiformi, gli spazi liberi senza microscultura, lucenti; distalmente più scuro, a scultura rugosa. La scultura dei lati del torace ana-

loga a quella della ♀ ma più fitta, a punti confluenti; a differenza della ♀, gli sterniti sono anche punteggiati, con punti più piccoli che sulle pleure. La scultura degli sterniti addominali è analoga a quella della ♀, ma questi portano dei peli abbondanti, lunghi, piegati a ricciolo, che formano come un vello lanoso regolarmente disposto, più distante via via che si procede distalmente. Corpo più peloso che nell'altro sesso. Pennelli bene sviluppati.

È specia propria dell'Asia centrale. Si trova nelle stesse località e nelle stesse epoche che *erythrocephala* Dahlb., ma è meno comune.

3. — C. sulcipyga nov. spec. (vedasi Nota alla fine, pagina 193).

♀. — Lunghezza 20 mm. — I due esemplari conosciuti coincidono perfettamene per il colore. Alla faccia sono rosse la parte media del clipeo, sfumature sui lati della faccia e le mandibole. I lati e le parti ventrali del torace sono tutti neri. Le zampe sono rosse meno la base delle tre paia di anche. Gli serniti addominali sono rossi.

I margini oculari sono quasi paralleli, se mai tendono a convergere al clipeo (distanza respettive all'altezza dell'ocello anteriore e al clipeo come 24 a 23). La linea che unisce fra loro gli ocelli posteriori passa subito dietro il margine posteriore dell'occhio: la distanza dei due ocelli fra loro sta a quella fra ciascuno di essi e il margine oculare corrispondente come 8 sta a 9. Le mandibole sono bene sviluppate e differiscono da quelle delle altre *Cerceris* per avere l'apice largamente arrotondato, il margine mediale ottuso ed un tubercolo su di questo che, quando le mandibole si chiudono, viene a porsi subito sotto al tubercolo che termina ai due lati il margine distale della parte media del clipeo. Il clipeo non è così nettamente distinto dalla faccia come nella maggior parte delle altre *Cerceris*. La parte media presenta in alto e sui lati, fino al punto dove si staccano le parti laterali, una sutura sottile ma evidente che si continua un poco anche più in basso, ma presto cessa. La parte centrale si continua fino al margine libero che è leggermente convesso, larghissimo, limitato ai lati da un tubercolo; da questo si parte una carena diretta in alto e verso l'esterno che contribuisce a delimitare all'incirca le parti laterali. Queste in alto sono separate dalla faccia da un rilievo lineare (non da una sutura) che decorre a linea curva con concavità diretta in basso ma non raggiunge il margine oculare, talché vicino a questo le parti laterali del clipeo e i lati della faccia si continuano senza limite netto. Nell'insieme il clipeo è pianeggiante (non sporge affatto di profilo). La scultura della parte media è semplice e consta di punti mediocri molto irregolarmente disposti, qua fitti, là lascianti spazi liberi assai grandi; quella delle parti laterali è doppia, con punti simili a quelli della parte media e gli spazi liberi portanti una micropuntuazione irregolare, non fitta, che non impedisce alla parte di apparire lucidissima. Il margine libero della parte laterale è sinuoso (convesso lateralmente, concavo medialmente) e porta una fitta frangia di corti peli

rigidi giallastri non conglomerati. I lati della faccia sono concavi verso l'inserzione antennare; la carena interantennare è sottile, tagliente, piuttosto corta. La scultura della testa è a punti più grossi di quelli del clipeo, confluenti, tendenti a disporsi in strie, formanti quasi un grossolano reticolo al vertice e sulle tempie. Queste due ultime parti sono normalmente sviluppate; le tempie portano sul lato ventrale, dove corrono verso le guance, del resto virtuali, una fitta peluria bianco-argentea, eretta. Le antenne sono cilindriche.

Il collare è pianeggiante, senza rilievi alle spalle, sito all'altezza del dorsulo, a scultura meno fitta di quella della testa, i punti essendo staccati e spesso non a contatto fra loro. La larghezza massima del dorsulo sta alla sua lunghezza come 30 a 20, il dorsulo e lo scutello sono pianeggianti, il postscutello è poco convesso: i primi due portano punti simili a quelli del vertice, meno fitti e tendenti a disporsi a strie longitudinali, l'ultimo punti allungati trasversalmente, più fitti di quanto si sogliano osservare su questa parte nelle altre specie del genere. L'area cordata, triangolare, piuttosto piccola e allungata, porta sui lati strie grossolane e al mezzo verso la base uno spazio triangolare con microscultura a strie relativamente accentuate. I lati del segmento mediano sono scolpiti come il vertice e l'occipite.

Le zampe presentano caratteri peculiarissimi. I tarsi sono eccessivamente corti per rapporto alle tibie, sicché alle zampe posteriori, per esempio, tutto il tarso raggiunge appena la lunghezza della tibia (rapporti numerici di queste parti come 30-15-5-3-2-6). Tibie e tarsi sono inoltre ricchissimi di spine e di peli come in nessun'altra delle specie a me note (la sola che si avvicini, ma da molto lontano, a *sulcipyga* nov. spec. per le dimensioni e l'armatura delle zampe è *lutea* Taschbg.). Le spine del pettine sono lunghe, robuste, in numero di 6 oltre le due terminali; i tarsi 2° a 4° sono pure armati di due forti spine terminali ciascuno, lunghe il doppio della loro lunghezza. Tutti gli articoli sono riccamente coperti di peli rigidi spiniformi. L'apparecchio di toelette presenta caratteri peculiari (vedasi la figura 21, Tavola IX). Anche la tibia anteriore è riccamente pelosa e porta forti spine al lato esterno. Tibia e tarsi intermedi sono muniti di spine in tal numero da ricordare il velo dell'istrice (vedasi la figura 23, Tavola IX) specialmente all'estremità distale della tibia. Sulla tibia posteriore si possono contare ben 13 spine al lato esterno, oltre il ciuffo di peli all'estremità prossimale e il mazzetto di spine a quella distale, inserite come al solito su rilievi, che però sono assai più piccoli che nelle altre specie. I tarsi sono pure spinosissimi, benché un po' meno degli intermedi. Le unghie sono piuttosto forti, i pulvilli bene sviluppati. Gli sproni delle tibie intermedie e posteriori raggiungono la metà del metatarso corrispondente a causa della brevità di questo. Le anche, i trocanteri e i femori non presentano caratteri speciali salvo la pilosità. Le scagliette sono lisce e lucenti.

Il peziolo è notevolmente più largo che lungo, la sua larghezza al margine distale sta a quella del 2° segmento allo stesso margine come 22 sta a 32. I tergiti presentano una microscultura reticolata regolare e punti grossi, profondi, fitti, spesso confluenti; sono assai poco convessi. Il campo pigidiale è trapezoidale, col margine libero tagliente, leggermente sinuoso, limitato da un dente su ogni lato, a superficie rigorosamente piana, coi margini laterali rilevati. La scultura è differente da quella di questa regione in tutte le altre *Cerceris* à me note e consiste in solchi longitudinali regolarissimi, quasi rigorosamente paralleli, su fondo liscio e lucente privo di microscultura.

Le parti laterali del protorace al disotto dei calli omerali sono grossolanamente rugose. Le mesopleure e i lati del segmento mediano sono reticolato-puntati, le metapleure striate trasversalmente. Le mesopleure portano all'estremo latero-ventrale una spinula quasi impercettibile. Il mesosterno è leggermente concavo, reticolato-puntato, il metasterno pure concavo, liscio. Tutte queste parti sono riccamente munite di peli lunghi, bianchi. Il 1° sternite è completamente liscio, lucente, il 2° è privo del rilievo basale. Gli sterniti dal 2° al 5° portano punti superficiali mediocri, distanti fra loro da una a tre volte il loro diametro, su fondo a microscultura irregolare, quasi nulla sul 2°, meglio visibile andando verso i seguenti. L'ultimo sternite visibile e piano, liscio, con le due apofisi terminali molto corte.

Due esemplari conosciuti. — T i p o : Wasta, 12 Nov. 1934; C o t i p o : Kharga, Febbraio 1912.

♂. — Lunghezza 14 mm. — Corrisponde alla ♀ per il colore, solo ha tutto il collare, une sfumature sulla metà distale dello scutello e il postscutello rossi. Alla faccia son rossi il clipeo, la carena interantennare e i lati, il color rosso proseguendo in alto lungo i margini oculari fin poco sotto l'altezza dell'ocello anteriore. Mandibole rosse a apice nero. Lati del torace e petto neri, zampe tutte rosse salvo l'oscuramento apicale delle tibie posteriori come nella ♀, sterniti addominali rossi, tergiti addominali come nella ♀.

Margini oculari rigorosamente paralleli; gli ocelli situati come nella ♀ (la distanza interocellare sta a quella fra ocello e occhio come 6 sta a 8). Le mandibole, più piccole che nella ♀, sono appuntite, di forma ordinaria. Il clipeo è allungato (il diametro longitudinale sta al diametro trasverso massimo come 12 a 8), la parte media è più larga che distante dall'occhio (il diametro trasverso massimo sta alla distanza dall'occhio come 8 sta a 6); i lati sono ben delimitati in alto, divisi dalla parte media non da una sutura ma da un solco obliquo diretto dall'esterno verso la parte mediale, concavi, a margine sinuoso mal visibile perché coperto dalla frangia di peli agglutinati, sviluppatissima. La scultura del clipeo è a punti piccoli non confluenti, lascianti spazi eguali a 1-2 volte il loro diametro, senza microscultura di fondo. I lati della faccia sono concavi verso l'inserzione antennare, a punti più grossi quasi a contatto fra loro. Carena interantennare di forma ordinaria. Occipite e tempie

bene sviluppati, con scultura reticolato-puntata come nella ♀. Le antenne sono cilindriche come nella ♀, con l'ultimo articolo troncato e leggermente incavato dal lato mediale.

Forma e scultura del torace compreso il segmento mediano come nella ♀, solo la scultura più grossa. I peli bianchi sulla testa e il torace sono più abbondanti che nell'altro sesso.

Le zampe sono meno sviluppate che nella ♀ ma i vari segmenti conservano gli stessi rapporti di lunghezza e le spine sono di gran lunga più abbondanti che in ogni altro ♂ di *Cerceris* a me noto, quasi così abbondanti come in *lutea* Taschbg. ♀. Apparecchio di toeletta delle zampe anteriori, unghie e pulvilli come nell'altro sesso. Le ali portano la stessa fascia marginale scura e nettissimamente limitata.

Tergiti addominali con scultura più grossa e più fitta che nella ♀, il 1° con un leggero incavo longitudinale mediano al mezzo del margine distale. Campo pigidiale a triangolo tronco con la base (in projezione) due volte più larga dell'apice, a punti grandi e superficiali senza microscultura di base, a fondo lucido, piano, coi margini laterali rialzati e quello distale non tagliente, senza denti laterali; sol suo terzo distale presenta accenno a striatura longitudinale.

Scultura delle pleure e del petto come nella ♀, manca il denticolo della mesopleura. Sterniti addominali ricoperti da una fitta frangia di peli lunghi che cuoprono quasi del tutto la scultura e sporgono di profilo; frange e pennelli terminali bene sviluppati.

Tipo: Gebel Elba, 30 Gennaio 1938.

Questa specie presenta caratteri così peculiari che si sarebbe tentati di creare sulla sua base un sottogenere: si pensi alla forma del clipeo, a quella delle mandibole, alla ricchezza di spine delle zampe, alla scultura del campo pigidiale. Non è il caso di suddividere il genere solo perché il ♂ riprende i caratteri ordinari. Per la forma del clipeo e la scultura del campo pigidiale non si avvicina a nessun'altra specie egiziana; per la scultura dell'area cordata a *capito* L. e a *rutila* Spin.; per la forma delle zampe a *lutea* Taschbg. e a *pharaonum* Kohl.

4. — C. rutila Spin.

Questa specie corrisponde esattamente alla descrizione della *C. rubecola* Schlett.; poiché però per il colore, le dimensioni, la scultura dell'area cordata e gli altri pochi caratteri ricordati si accorda anche con la descrizione della *C. rutila* Spin. e dato anche che nessuna altra specie egiziana si presta a confusione, ritengo che il primo nome sia da conservare. *C. rubecola* Schlett. cade quindi in sinonimia.

♀. — Lunghezza 10-12 mm. — Nella mia collezione, 8 esemplari e in

quella del Ministero di Agricultura 2 corrispondono esattamente alla figura 4 ♀ (Tavola I) per il colore. Alla faccia sono rosse le mandibole meno la punta, i due terzi superiori della parte media del clipeo e una larga macchia rotondeggiante su ciascun lato, al disopra delle parti laterali del clipeo, fra l'inserzione antennare e il margine oculare. Nere le anche, nereggianti i trocanteri, tutte nere le pleure e gli sterniti toracici. Al ventre sono rossi il 1° sternite e il 2° e 3° sulla parte prossimale.

I margini oculari sono quasi parelleli (distanza all'altezza degli ocelli e a quella del clipeo come 21 a 19). La distanza interocellare sta a quella fra l'ocello e l'occhio corrispondente come 6 sta a 8; gli ocelli son disposti a triangolo ottuso. Le mandibole portano due denti ottusi, piccoli, al margine interno, al limite fra i due terzi prossimali e il terzo distale; la punta è piuttosto ottusa. La parte media del clipeo sporge in avanti in forma di un rilievo a triangolo tronco e margine ottuso; al disotto di questo il margine è retto e porta a ciascun lato due piccolissimi bottoni posti l'uno accanto all'altro, in gran parte ricoperti dai peli. Le parti laterali, pianeggianti, hanno il margine libero appena convesso, coperto da una frangia fitta di peli rigidi. I lati della faccia sono pianeggianti, le guance assenti, la carena interantennare corta e tagliente, l'occipite e il vertice normalmente sviluppati. Le antenne sono leggermente clavate: la larghezza del 2° articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 6 sta a 8. La scultura della testa è formata da punti piccoli e sparsi sul clipeo, che vanno divenendo più grandi e più fitti risalendo verso gli ocelli e raddoppiano quasi di grandezza e di profondità sul vertice e sull'occipite, dove formano reticolo.

Il collare è un po' più basso del dorsulo, che quindi si incurva leggermente in basso sul suo terzo anteriore, limitato in avanti da un rilievo lineare ben visibile specialmente sui lati, a angoli laterali arrotondati. La scultura è rappresentata da punti grandi quanto quelli del vertice ma radi, lascianti fra loro spazi larghi da una a due volte il loro diametro, coperti di microstriole trasversali. Il dorsulo è più largo che lungo; il suo diametro trasverso massimo sta al longitudinale mediano come 45 a 30; porta punti più grandi che sul collare, isolati, ovalari, a grande asse antero-posteriore, assai profondi, lascianti fra loro spazi lucenti quasi del tutto privi di microscultura. Lo scutello è poco convesso, con punti simili a quelli del dorsulo ma più radi, interspazi lisci. Il postscutello è assai convesso, a punti piccoli, il cui diametro è appena un terzo di quelli dello scutello e del dorsulo, staccati. L'area cordata è triangolare, assai piccola, non troppo allungata e porta grosse creste longitudinali — 7 ad 8 per lato — separate da un largo solco al mezzo, che non giungono fino all'apice, il quale è grossolanamente rugoso. I lati del segmento mediano sono fortemente reticolato-puntati.

Le zampe sono assai meno tozze che in *sulcipyga* nov. spec., poco spinose. Le anteriori portano al pettine 6 spine, comprese le due apicali; l'apparecchio

di toeletta è corto e tozzo; le anche si prolungano a cono lateralmente. Le intermedie sono normalmente spinose. Le tibie posteriori hanno 5 spine al margine esterno poste su rilievi relativamente sviluppati. I rapporti di lunghezza delle tibie e dei tarsi posteriori sono espressi dai numeri: 40-26-11-9-5-10. Unghie mediocri, pulvilli piccoli, chiari. Sproni brevi. Scaglette lisce e lucenti.

Il peziolo è notevolmente più largo che lungo: la sua larghezza al margine distale sta a quella del margine distale del 2° segmento come 30 a 55. La sua scultura è grossa quasi come sul segmento mediano; i punti sono a contatto ma conservano la loro forma rotonda, non formano cioè reticolo; ha il margine distale ben circinnato con un incavo evidente al mezzo. Gli altri segmenti portano punti assai più piccoli, radi, su microscultura delicatissima, reticolato-striata; dal 2° all'ultimo questa microscultura diviene più evidente e i punti raffittiscono. Il campo pigidiale è conico, con la punta arrotondata, i margini laterali lievemente rialzati, la superficie appena convessa, quasi piana, col fondo a microscultura rugosa sulla quale spiccano in alto 5-6 punti rotondi, staccati (descritti anche dallo Schletterer in *rubecola* Schlett.) e al mezzo grosse rughe prevalentemente trasversali che divengono più piccole, reticolato-raggiate verso l'apice.

Le propleure sono grossolanamente striate dall'avanti all'indietro, il prosterno ha una microscultura regolare puntato-striata che lo rende opaco. Le mesopleure sono reticolato puntate come il mesosterno, con un denticolo poco evidente al mezzo del margine distale. Il metasterno è longitudinalmente rugoso-striato con un incavo ovalare aperto distalmente sul terzo distale. Il 1° sternite, con carena mediale bene sviluppata e carene laterali vicine ai margini, delimitanti con questi uno spazio triangolare, ha al mezzo strie-rughe evidenti e sui detti spazi triangolari striole finissime frammiste a punti microscopici. Il 2° sternite manca di rilievo basale e, come gli altri, porta punti superficiali piccoli e sparsi su di un fondo a microstriatura trasversale, lucente. Le apofisi dell'ultimo sternite visibile sono assai lunghe.

Tutto il corpo è riccamente coperto di peli, bianchi e assai lunghi e abbondanti sui lati e ventralmente alla testa e al torace, giallastri e corti sul ventre. Pennelli terminali bene sviluppati.

Un esemplare della mia collezione presenta qualche differenza dal tipo. Il tòno del rosso è un po' diverso (giallastro a luce artificiale), il peziolo, tutti gli sterniti meno una macchia centrale sul 2°, i trocanteri, le basi dei femori delle prime due paia, tutto il clipeo, le mandibole meno una sfumatura all'esterno della base, sono neri. La scultura è più fitta e più grossa, la microscultura invece meno evidente, quindi nell'insieme l'insetto è più lucente. Poiché gli altri caratteri sia cromatici che strutturali sono identici, ritengo si tratti di una variazione individuale priva di speciale importanza.

♂. (? inedito). — Lunghezza 9,5 mm. — Colore molto simile a quello

della ♀, solo le fasce dei tergiti addominali tendono al giallastro: il 1° segmento è tutto nero, la fascia nera del 2° è piccola, quella del 3° e del 4° ordinarie, quella del 5° comprende quasi tutto il segmento, non lasciando che due piccole macchie allungate trasversali ai lati del margine distale; 6° e 7° segmento tutti neri, al ventre fasce distali chiare sul margine del 2° e 3° sternite. Torace tutto nero, scagliette chiare. Alle zampe neri le anche, i trocanteri e la base dei femori delle due paia anteriori, le sole anche alle posteriori. Alla faccia, le mandibole nere meno una stria giallo-rossastra al margine esterno alla base; tutto il clipeo, la base della carena interantennare e i lati fin subito sopra l'inserzione delle antenne, giallo limone. Alle antenne sono rosso-giallastri lo scapo e i primi 4 articoli del funicolo; il 5°, 6° e un po' anche il 7° sono anneriti al disopra, chiari al disotto, gli altri neri, meno l'ultimo, chiaro.

Margini oculari a divergenza simile a quella della ♀; la distanza interocellare eguale a quella fra l'ocello e l'occhio corrispondente. Mandibole meno sviluppate che nella ♀, a margine interno non dentato, appena arcuato. Clipeo con la parte media esagonale, larga il doppio della sua distanza dall'occhio, col margine libero ristretto, retto. Il margine delle parti laterali convesso, coperto di scarsa frangia pelosa appena agglutinata. Le antenne sono appena più clavate che nella ♀, con l'ultimo articolo quasi cilindrico. Le altre parti della testa come nella ♀, la scultura più fina ma nell'insieme più fitta, egualmente distribuita. Forma e scultura del torace e dell'addome come nell'altro sesso, solo manca il denticolo alle mesopleure. Il campo pigidiale è quasi rettangolare, a margini laterali molto rialzati, con microscultura di base come nella ♀ e numerosi punti staccati. Zampe meno sviluppate che nella ♀, conservanti gli stessi rapporti di lunghezza e la stessa proporzione delle spine. Colorazione delle ali come nella ♀. Pilosità più abbondante che nell'altro sesso, più lunga sul ventre.

Tipo: Hawamdieh, 11 Febbraio 1926.

La specie non può dirsi rara, ma non è neppure fra le più comuni. I miei 8 esemplari tipici provengono dalla zona del Mariut, quello a colorazione anormale dai dintorni di Cairo; nella collezione del Ministero di Agricoltura e in quella del Dott. A. Honoré ho però visto esemplari tipici anche del Cairo.

5. — C. Komarovi Rad.

Questa specie si avvicina molto per l'aspetto generale e per il colore a quelle ad addome giallo e pilosità argentea caratteristiche del deserto, che saranno descritte or ora. Se non la pongo in questo gruppo si è perché in alcuni esemplari il colore nero è più abbondante, comprendendo, oltre le macchie sul dorsulo, sul segmento mediano e sulla testa anche macchie sul collare, sulla quasi totalità del lato ventrale del torace e sui segmenti addominali

che, in certo modo, si possono considerare come fasciati all'estremo margine distale. I colori sono simili nei due sessi; gli esemplari più scuri sono dei ♂♂. Pure nei due sessi le nervature alari sono scure, quasi nere negli esemplari a macchie più abbondanti, meno la costa sempre gialla. Le zampe sono gialle, infuscate sui tarsi delle due paie posteriori. Le antenne sono giallo-rossastre con gli ultimi articoli un po' infuscati al disopra.

♀. — Lunghezza 12 - 13,5 mm. — Margini oculari divergenti, la distanza all'altezza dell'ocello anteriore sta alla distanze al clipeo come 18 sta a 21. La distanza degli ocelli fra loro sta alla distanza di ciascun ocello dall'occhio corrispondente come 5 sta a 7; gli ocelli sono disposti a triangolo equilatero. Le mandibole portano, all'unione dei due terzi basali col terzo distale, due denti ravvicinati al margine interno, dei quali il distale è il più grande. Il clipeo ha la parte media un poco più larga che alta, di poco più larga che distante dal margine oculare, di forma caratteristica: la parte centrale è rialzata a piramide, il cui vertice, posto al centro geometrico, porta due tubercoletti piccolissimi, ravvicinati, presso la linea mediana. L'estrema parte distale, a superficie irregolare e rugosa, ha il margine libero retto, con ai lati un denticolo, o meglio uno scalino, che lo divide dal margine delle parti laterali; questo è leggermente sinuoso (convesso ai lati, concavo medialmente). La carena interantennare è bene sviluppata, tagliente; i lati della faccia sono appena concavi. Vertice e occipite normalmente sviluppati. Al mezzo del margine infero-laterale della tempia si osserva un grosso dente un po' curvo verso l'avanti, caratteristico della specie. Il clipeo porta punti piccoli e superficiali, scarsissimi e irregolarmente disposti sulla parte media, un po' più fitti sulle laterali; alla faccia i punti sono assai più grandi e più fitti e ingrandiscono e raffittiscono verso il vertice e l'occipite, senza però dar mai luogo a reticolazione, salvo forse nelle regioni poste lateralmente agli ocelli. Le antenne sono leggermente clavate.

Il collare, visto dal disopra, presenta il margine anteriore circinnato, che, un poco prima delle spalle, si eleva ad angolo; inferiormente e lateralmente a questo angolo si nota une gibbosità poco accentuata ma evidente, arrotondata. Il centro è leggermente depresso. Il dorsulo è di forma solita, lo scutello e il postscutello assai larghi. La scultura di queste parti consta di punti staccati, bene individuati, più grandi sul dorsulo, divisi da spazi non maggiori del loro diametro, sopra un fondo a micropuntuazione e microscultura fittissime che rendono le parti opache. L'area cordata non è molto grande, con solco longitudinale mediano evidente, opaca, coperta di microstriature obliquanti dal mezzo verso i lati e in basso sui tre quarti prossimali, arcuate e traversanti la linea mediana sul quarto distale; dette microstrie si continuano sulla parte declive del segmento, che cade dolcemente in basso. I lati del segmento mediano portano puntuazione fitta, confluente, quasi reticolata e sono coperti di corti peli eretti bianchi.

Le zampe sono assai corte e tozze, ma molto meno che in *lutea* Taschbg. Il pettine porta 7 spine mediocri, piuttosto fini. L'apparecchio di toeletta delle tibie anteriori è del tipo corto come in *rutila* Spin. L'armatura delle tibie intermedie è mediocremente sviluppata; le tibie posteriori portano al margine esterno 6 spine corte (senza contare il mazzetto distale). La tibia e i tarsi posteriori stanno fra loro come 48-28-11-8-5-12. Unghie forti, pulvilli normali. Scagliette lisce.

Il peziolo è largo quasi quanto lungo: il suo margine distale sta, per larghezza, al margine distale del secondo tergite come 17 a 25. I tergiti portano tutti scultura omogenea, a punti grandi quanto quelli del dorsulo, isolati, separati da spazi assai maggiori del loro diametro, su un fondo opaco per fitta microstriatura. Il campo pigidiale è allungato e piuttosto ristretto, trapezoidale, col margine distale retto, passante dolcemente ai lati, senza angoli; i lati non sono affatto rilevati sulla metà distale, lo sono appena sulla prossimale. La scultura di fondo è formata di microrughe; sui tre quarti prossimali si trovano anche dei punti bene individuati, il cui diametro è un quarto di quelli dei tergiti, che raffittiscono via via che ci si avvicina alla base. Ciglia laterali e pennelli terminali normalmente sviluppati.

Il prosterno porta al mezzo dei due lati un rilievo piramidale simile a un dente, chiaramente visibile; la scultura è rappresentata da una micropuntuazione con qualche scarso punto più grande, non tanto però da costituire una vera macroscultura. Le propleure sono pubescenti, microstriate. Ai limiti fra mesopleure e mesosterno, a tre quarti circa dal margine prossimale, si trova un dente ben visibile, seguito da un altro posto distalmente sulla stessa linea longitudinale, subito al disopra della cavità articolare per le anche intermedie. Sulle mesopleure la scultura è formata da puntuazione assai fitta su microreticolazione; sul mesosterno i punti divengon più rari e verso la linea mediana scompaiono lasciando soltanto la microscultura; anche il metasterno porta soltanto microreticolazione bene evidente. Manca il rilievo basale sul secondo sternite; gli sterniti a punti superficiali, irregolari per grandezza e disposizione. Le apofisi dell'ultimo sternite visibile sono spatuliformi, lunghe e lucenti. Pilosità modica, bianca.

♂. — Il ♂ di questa specie è stato descritto dal Morice nel 1911, su esemplari dell'Algeria. Nel 1897 questo stesso autore aveva descritto sommariamente sotto il nome di *hirtiventris* un ♂ di Egitto che, per quanto riguarda gli scarsi caratteri strutturali menzionati, coincide col ♂ di *Komarovi* Rad.; solo l'estensione del colore nero è descritta come più diffusa che nella media degli individui di questa specie. Nella mia collezione ho esemplari che coincidono con la descrizione del Morice anche su questo punto; d'altra parte non mi è riuscito di trovare nei dintorni del Cairo alcun esemplare che, corrispondendo alla descrizione di *hirtiventris* Morice, non presentasse anche insieme i caratteri del ♂ di *Komarovi* Rad.: forma degli ultimi articoli delle

antenne, incavo sul quinto sternite, scultura dell'area cordata, estensione della macchia dell'apice alare, etc.. A togliere ogni dubbio sulla legittimità dell'attribuzione del sesso, il Dott. A. Honoré ha trovato una coppia di questa specie in copula che mi ha gentilmente mostrata, il cui ♂ coincide perfettamente con le descrizioni del Morice. Ritengo dunque che *hirtiventris* Morice ♂, non più ritrovata, che io mi sappia, da nessuno, non menzionata da questo autore fra le specie raccolte in Algeria, debba ritenersi sinonimo di *Komarovi* Rad. ♂.

Lunghezza 10-12 mm. — Nell'insieme è più facile trovare ♂♂ in cui le macchie nere sono più abbondanti sia sul torace che sull'addome, dove talora formano sottili fasce all'estremo distale del segmento e si continuano sul ventre.

La distanza dei margini oculari all'altezza dell'ocello anteriore sta alla distanza al clipeo come 13 sta a 16. Gli ocelli posteriori distano fra loro più che dall'occhio corrispondente (come 6 sta a 4). Mandibole appuntite, col margine mediale appena ondulato. La parte media del clipeo un poco più alta che larga (come 10 sta a 8), due volte più largo che distante dall'occhio, convessa su meno dei due terzi superiori, a margine libero retto, con accenno a un tubercoletto al mezzo; il margine delle parti laterali leggermente concavo, con peli marginali poco abbondanti. I lati della faccia piuttosto convessi, la carena interantennare tagliente, corta. Le tempie non presentano l'apofisi caratteristica dell'altro sesso e portano peli bianchi, eretti. Antenne nettamente clavate: la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 5 sta a 7. Scultura della testa distribuita come nella ♀ ma nell'insieme un po' più grossa e fitta. Torace come nella ♀, i tubercoli postero-laterali del torace più accentuati, la scultura simile, senza microscultura. Le strie dell'area cordata sono simili a quelle della ♀ ma molto più accentuate. Anche all'addome la scultura è più grossa e fitta che nella ♀; al mezzo del margine distale dei tergiti si osserva una fossetta, maggiore sul primo, di profondità e grandezza decrescente sui seguenti. Il campo pigidiale è quasi esagonale, avendo i margini laterali paralleli ed il distale diviso in tre lati; porta punti superficiali di poco minori di quelli dei tergiti su microreticolazione di fondo che scompare sul terzo prossimale. Le zampe sono conformate come nella ♀ ma meno robuste. Il metatarso intermedio è leggerissimamente incurvato, ciò che può dar luogo a confusione con il ♂ di *capito* Lep.; ma la curva è di molto meno accentuata e del resto la macchia dell'apice alare è nettamente diversa.

Mancano i denti alle mesopleure. Il quinto sternite porta un'impressione semilunare caratteristica. Tutti gli sterniti sono coperti di peli eretti, lunghi, che appaiono come spazzolini se si guarda l'animale di profilo. Questo carattere spiega il nome di *hirtiventris* dato dal Morice agli esemplari descritti nel 1897. Nella descrizione del 1911 (♂ di *Komarovi* Rad.) la des-

crizione suona invece così: « Corpus, facies praesertim et segmentorum ventralium apices, pilis argenteis vestitum; his tamen, nisi sub certa lucis incidentia, vix conspicuis ». Non credo si possa infirmare l'identità dei miei esemplari a causa di questo carattere. Può trattarsi di una differenza locale (gli esemplari del 1911 sono dell'Algeria), ma è più probabile che i peli fossero caduti in esemplari vecchi. Tutta la descrizione dei peli della parte ventrale dell'addome mi sembra del resto poco chiara: non riesco, per esempio, a vedere sui miei esemplari i quattro pennicilli dell'ottavo sternite descritti dal Morice. Forse si trattava di agglutinazione occasionale dei peli.

La ♀ di questa specie è piuttosto rara: ne ho potuti esaminare solo 6 esemplari, contro 20 ♂♂. Sembra che il sesso ♀ si presenti ad epoche fisse e per corti periodi. Il Dott. A. Honoré ha trovato molte ♀♀ presso Sakkara in un sol giorno; in seguito, come tutti gli altri raccoglitori, solo qualche esemplare sparso. La specie è caratteristica della bordura del deserto. I ♂♂ sono quasi tutti catturati in Maggio; le ♀♀ sono del Maggio, Giugno, Agosto ed una, in cattivo stato, dell'Ottobre. La specie è di quelle appartenenti alla fauna delle steppe dell'Asia centrale.

6. — C. Döderleini Schulz.

Il ♂ di questa specie è stato descritto dell'Algeria dallo Schulz. La descrizione di questo Autore è cosi perfetta che mi limito a riportarla integralmente senza aggiungerci nulla. I due esemplari che ho catturati corrispondono esattamente alla descrizione originale, soltanto differiscono per il colore, i disegni e le zampe essendo tutti gialli e non rossastri; il color rosso però si presenta nella ♀, che era finora ignota.

« ♂. Longitudo 9,5-13 mm.

Species clypei media parte longitudinaliter carinata distinctissima.

Oculorum margines interni clypeum versus parum divergunt. Clypei media pars longior quam latior, campanuliformis, ad basim convexa, disperse punctata, deinde impressa vel deplanata, glabra, nitida aut vix punctata, in medio fortiter longitudinaliter acute carinata, margine apicali truncato, haud dentato. Flagelli articulus secundus vix duplo, tertius sesqui primo longior. Ocelli posteriores inter se et ab oculis longitudine flagelli articulorum secundi plus dimidio primi distant. Antennae clavatae.

Pronotum in medio haud vel solum leviter impressum. Mesonotum et scutellum nitida, subtiliter, hoc disperse, illud mediocriter dense, punctata. Mesopleurae dente laterali, nonnunquam sub pubescentia densa abscondito, munitae. Alae leviter ad apicem magis affumatae. Metatarsus secundus rectus.

Segmentum medianum opacum, dense subtiliter transverse rugoso-striatum, inter rugas punctatum; area cordiformis postice sub-nitida, antice dense coriaceo-punctata aut oblique striolata.

Abdominis opaci, subtilissime densissimeque punctati segmentum ventrale penultimum margine postico longe ac dense fimbriato.

Nigra. Mandibulae apice nigro excepto, clypeus, facies, interdum occipitis maculae duo parvae, pronoti maculae duae laterales, tegulae, nonnunquam metanoti fascia, in medio interrupta, ac segmentorum abdominalium dorsalium secundo ad quarto margines anteriores flavi. Coloris fulvi sunt : antennae, flagello supra nigro excepto, pedes, abdominis segmentum secundum ad sexto, haec partim nigro lavata. Femina latet ».

Traduco dal tedesco la descrizione particolareggiata :

« Faccia stretta, a punti assai fini e confluenti come la fronte ; talora i punti meno fitti al vertice intorno agli ocelli. Parte media del clipeo più lunga che larga, press'a poco campaniforme, due volte più larga che distante dagli occhi, convessa, a punti sparsi o assai fitti nel suo terzo superiore, sulla parte distale impressa longitudinalmente, liscia e lucente o poco punteggiata, con una carena longitudinale forte e netta sul mezzo, che termina con un rilievo sporgente dal mezzo del margine anteriore, altrimenti troncato e non dentato. Margini oculari poco divergenti verso il clipeo. Il secondo articolo del funicolo lungo appena due volte, il terzo una volta e mezzo più del primo. Distanza degli ocelli posteriori fra loro e dagli occhi eguale a un poco più della lunghezza del secondo articolo del funicolo più circa la metà del primo. Antenne fortemente clavate, gli articoli progressivamente più grossi a partire dal quarto, il penultimo più grosso di tutti, l'ultimo leggermente piegato, con la punta arrotondata ma tronca obliquamente. Lato interno delle antenne un poco appiattito, sugli articoli, dal mezzo in poi, è accennata una sottile carena longitudinale.

Collare quasi senza insellatura al mezzo, finemente puntato-coriaceo, spalle largamente arrotondate. Dorsulo e scutello lucenti, a punti assai fini, più sparsi sull'ultimo. Mesopleure con un denticolo, talora coperto dai peli. Ali infumate, le anteriori più sulla cellula radiale, all'apice e al margine esterno.

Segmento mediano rugoso-puntato e finemente rugoso-striato trasversalmente, con punti fitti, mediocri fra le strie. Puntuazione non sparsa in vicinanza dell'area cordata ; questa a puntuazione fine e fitta, coriacea, quasi zigrinata, con alcune rughe più grosse agli angoli latero-anteriori, oppure trasversalmente rugoso-striata sulla parte anteriore, più liscia e lucente sulla posteriore, la linea longitudinale mediana talora visibile solo sulla parte posteriore.

Addome al disopra a puntuazione finissima, coriacea, quindi opaco, i punti più forti sul primo segmento dorsale, dove distano anche di più fra loro. Il primo segmento campaniforme come negli *Odynerus*, con la parte orizzontale ben distinta dalla verticale, arrotondato al limite fra le due, con un'impressione longitudinale al disopra al mezzo del margine distale, che si continua sul resto del segmento sotto forma di una fine incisione. Campo pigidiale sottile, oblungo, con margini laterali paralleli, netti, arrotondati

all'estremità, lucente, a punti sparsi. Sterniti pure a punti fini e fitti, senza rilievo alla base del secondo, senza impressioni longitudinali, denticoli o altro. Peli ventrali corti e assai fitti. I pennelli terminali non sono molto sviluppati; il penultimo segmento ventrale, invece, porta al margine distale un orlo di ciglia erette, fitte e lunghe.

Pilosità del corpo corta e scarsa, all'addome brunastra, al torace ed alla testa biancastra. Fra gli ocelli un ciuffo di peli lunghi, biancastri, ripiegati in avanti ».

A questa descrizione ben poco ho da aggiungere. Noto soltanto che nei miei due esemplari i peli bianchi eretti sono molto abbondanti: osservando l'animale di profilo si nota che gli sterniti portano, su ciascun lato, una vera spazzola di peli lunghi e abbondanti; gli ultimi due sono uniformemente coperti di questi peli lunghi che sporgono da ogni lato al disotto del campo pigidiale. Tibie e tarsi intermedi e posteriori spiccano per l'assenza quasi totale di spine. Gli articoli ungueali delle tre paia di zampe sono neri.

Due ♂♂ del Sinai (Wadi Umm Mitla): 22 Marzo 1937 e 24 Aprile 1938.

♀ (inedita). — Lunghezza 13 mm. — Alla faccia sono gialli il clipeo e i lati; nera la carena interantennare. Mandibole gialle a punta nera. Tempie rossastre. Pleure e sterniti toracici neri, zampe rosso-giallastre, comprese le anche e i trocanteri. Sterniti addominali rossastri.

Margini oculari poco divergenti: la loro distanza all'ocello anteriore sta alla distanza al clipeo come 18 a 21. Ocelli disposti a triangolo ottusangolo, i posteriori distano fra loro quanto dal margine oculare corrispondente. Mandibole corte e tozze, con un dente al mezzo del margine interno. La parte media del clipeo, larga quanto una volta e mezzo le parti laterali, forma una sporgenza conica notevolmente sviluppata il cui apice viene a trovarsi all'unione del quarto inferiore coi tre quarti superiori; al disotto di questa parte conica il margine libero è leggermente concavo, con un forte dente su ciascun lato. Il margine libero delle parti laterali è convesso. I lati della faccia sono pianeggianti, il solco d'inserzione delle antenne è quasi assente. Carena interantennare corta, alta e tagliente, continuantesi con una linea non rialzata che raggiunge l'ocello anteriore. Occipite e tempie molto sviluppati. Antenne clavate come nel ♂, la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 8 sta a 11. Sui lati del clipeo la scultura è coperta dai peli; sulla parte conica è formata da punti piccolissimi, staccati; sui lati della faccia da strie-rughe quasi microscopiche, oblique, dirette dall'alto in basso e dall'interno all'esterno; sul resto della testa da punti piccoli e piccolissimi, che si fanno più radi nella regione peri et retro ocellare.

Il collare è piuttosto stretto, a margini paralleli, convesso, non incavato al mezzo e appena rialzato sui lati, a punti scarsissimi, fini. È posto un po'

più in basso del dorsulo, che quindi si inflette leggermente in avanti ed è di dimensioni ordinarie: la sua superficie è liscia e lucente e porta al mezzo e in avanti dei punti microscopici fitti, sul resto dei punti piccoli, ma non microspocipi, scarsi. Scutello e postscutello leggermente convessi, lisci, a punti piccolissimi molto scarsi. L'area cordata, larga e corta, porta delle strie radiali assai profonde che vanno dalla periferia verso il solco mediano, obliquando leggermente in alto; fra le strie si trovano dei piccoli punti che divengono più abbondanti e visibili verso il mezzo, dove le strie si fanno invece più sottili e superficiali. I lati del segmento mediano portano pure strie raggiate, più fini di quelle dell'area cordata, di cui continuano la direzione, pure con micropunti frapposti. La parte declive del segmente mediano cade indietro dolcemente, non ad angolo retto.

Le zampe sono normalmente sviluppate, scarsamente spinose. Il pettine ha 6 a 7 spne mediocri. La tibia posteriore ha 5 spine inserite su rilievi assai alti. Rapporti di lunghezza della tibia e dei tarsi posteriori: 45-30-12-10-7-9. Anche anteriori coniche. Pulvilli bene sviluppati. Scagliette piccole, lucenti.

Segmenti addominali molto meno strozzati che d'ordinario, il peziolo molto più largo che lungo, la sua larghezza al margine distale sta alla larghezza del secondo segmento a questo margine come 33 sta a 51. I primi quattro tergiti portano un solco longitudinale mediano che sul primo termina in avanti in un piccolo tubercolo posto all'estremo margine antero-superiore del segmento, sugli altri si arresta al quarto distale. La puntuazione, consistente in punti molto fini, quasi microscopici, è fittissima sui segmenti 2°, 3° e 4°, un po' meno sul 5°, assai meno sul 1°. Il segmento mediano e i tergiti addominali appaiono più opachi della testa e del torace. Il campo pigidiale è subtriangolare, ad apice arrotondato, grossolanamente reticolato-rugoso.

Il prosterno è quasi liscio, le mesopleure portano strie-rughe grosse, il mesosterno punti fini, staccati, scarsi su un fondo micropuntato, opaco. Le mesopleure hanno una forte spina al mezzo del margine laterale. La puntuazione degli sterniti è simile a quella del mesosterno. Le apofisi dell'ultimo segmento visibile sono corte e larghe, separate da uno spazio più largo della larghezza di una di loro. Pilosità meno abbondante che nel ♂, biancastra.

T i p o: Sinai (Wadi Umm Mitla): 24 Aprile 1938.

Non ho trovato nessum esemplare di questa specie su territorio propriamente egiziano. Non presenta analogie con nessun'altra specie egiziana, somiglia molto, invece, per l'aspetto generale, al *Nectanebus Fischeri* Spin. e, come questo, ricorda i *Philanthus*. La ♀ ed il secondo ♂ volavano insieme ad un gran numero di esemplari di *Nectanebus*. A prima vista, la ♀ si può confondere con un ♂ di *Nectanebus Fischeri* Spin., di cui imita i colori.

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Il gruppo di *Cerceris* che desidero ora descrivere comprende le specie a colore prevalentemente giallo ed a pilosità bianca, caratteristiche del deserto. La sistematica di questo gruppo è estremamente difficile per la grande somiglianza che queste specie presentano fra loro a primo aspetto e per la nessuna importanza da attribuire alla distribuzione delle macchie nere. Queste, come già dissi, presentano gli stessi tipi di variazione in tutte le specie indifferentemente, di modo che si trovano esemplari a disegno identico in specie anatomicamente molto diverse. mentre nella stessa specie i disegni variano da un esemplare all'altro. La descrizione dei colori deve quindi esser fatta per il gruppo nel suo insieme.

L'addome è sempre giallo: i segmenti possono presentarsi leggermente più scuri, anneriti o arrossati all'estremo margine distale, ma non presentano mai fasce o macchie nel vero senso della parola. Al torace restano sempre gialli il collare, le scagliette, lo scutello, il postscutello e, in parte almeno, i lati del segmento mediano: la parte più frequentemente annerita in tutto o in parte è il dorsulo; più di rado è nera l'area cordata e una parte dei lati del segmento mediano. Il lato ventrale del torace è di rado tutto nero, spesso tutto giallo. Alla testa la macchia nera più costante si presenta nella regione degli ocelli e di qui può estendersi variamente sul vertice, sulla fronte e sull'occipite. Il clipeo è sempre giallo, le mandibole sono quasi sempre gialle alla base e annerite all'apice.

La maggior parte delle descrizioni antiche delle specie di questo gruppo, essendo basate esclusivamente sulla distribuzione delle macchie nere, è completamente inutilizzabile. A meno di un controllo coi tipi, considero da scartare definitivamente i seguenti nomi :

Cerceris citrinella Smith. — Siberia.
» *chlorotica* Spin. — Egitto.
» *flaviventris* v.d.Lind. — Spagna, Algeria.
» *spinolica* Schlett. (=*flaviventris* Spin.). — Egitto.
» *straminea* Dufour. — Algeria.
» *Waltli* Spin. — Egitto.

Delle specie che si trovano nella mia collezione, ne ho potute identificare 5 sulla base delle descrizioni esistenti e cioè :

Cerceris lutea Taschbg.
» *pharaonum* Kohl.
» *pruinosa* Morice.
» *pulchella* Klug.
» *pallidula* Morice.

Sono stato obbligato a considerare come nuove le altre.

7. — C. lutea Taschbg.

♀. — Lunghezza 12-13,5 mm. — Il colore è un bel giallo carico. I disegni neri della testa e' del torace sono generalmente poco abbondanti, limitati al vertice e al dorsulo.

I margini oculari sono quasi paralleli: la loro distanza all'altezza dell'ocello anteriore sta alla loro distanza al clipeo come 21 a 23. Gli ocelli distano fra di loro quanto ciascuno dal margine oculare corrispondente. Le mandibole sono bene sviluppate, appuntite: all'unione dei due terzi prossimali col terzo distale portano un grosso dente preceduto da un denticolo che si continua verso la base in un margine tagliente, leggermente sinuoso. La faccia è molto larga. La larghezza della parte media del clipeo sta alla altezza massima come 19 sta a 15; questa parte è quasi perfettamente piana, col margine libero quasi rettilineo, limitato ai due lati da un piccolo tubercolo. Le parti laterali sono pure piane, a margine libero leggermente convesso. I lati della faccia sono pianeggianti, l'incavo in cui sono inserite le antenne è poco accentuato. La carena interantennare è relativamente ottusa, con la parte tagliente poco rilevata. Guance assenti, occipite e tempie mediocremente sviluppati. Le antenne sono quasi del tutto cilindriche, con l'ultimo articolo leggermente smusso. La scultura del clipeo è formata da punti piccoli, superficiali, radi, un po' più fitti e più fini nella parte distale; il fondo è lucido, privo di microscultura. Ai lati della faccia e sulla carena i punti sono pure piccoli e superficiali, su fondo micropuntato, tendente a divenire microrugoso in alto, specialmente sulla parte della carena posta immediatamente sotto agli ocelli. I punti dell'occipite e delle tempie sono un po' più grossi e più fitti, su fondo liscio.

Il collare, posto a livello del dorsulo, ha i bordi paralleli, manca d'incavo al mezzo e di rilievi alle spalle e porta punti piccolissimi e radi. La larghezza del dorsulo sta alla sua altezza come 43 a 38; i punti sono irregolari, generalmente piccoli come sul vertice, radi, con qualcuno più grosso e più profondo specialmente sulle parti laterali. Anche sullo scutello e il post-scutello i punti sono scarsi, superficiali, piccoli, con alcuni pochi più grandi sulla parte distale-laterale dello scutello. L'area cordata è nettamente convessa, a triangolo isoscele, con solco centrale ben marcato; in un esemplare porta punti superficiali sui margini laterali e sulla regione viciniore. Parti laterali del segmento mediano a punti un po' più grossi che sulla testa, radi. Il fondo della parte dorsale del torace è tutto liscio, salvo sui lati del segmento mediano dove tende a divenire microrugoso.

Le zampe sono grosse e tozze. Il pettine del metatarso anteriore porta 6 spine lunghe e sottili; l'apparecchio di toeletta della tibia anteriore somiglia assai per forma a quello di *sulcipyga* nov. spec. Le lunghezze della tibia e dei tarsi posteriori stanno fra loro come 50-30-9-5-4-11. Le zampe intermedie e posteriori sono ricchissime di spine, benché molto meno che nella ♀

di *sulcipyga* nov. spec., quasi come nel ♂ di questa specie. Le tibie intermedie portano un ricco gruppo di spine al margine distale; le tibie posteriori hanno al margine laterale 9 spine forti e numerose altre sulla faccia laterale, disposte in tre serie, di cui una incompleta. Tarsi molto spinosi. Pulvilli molto sviluppati. Femori lisci, con pochi peli corti, più abbondanti sugli anteriori, dove sono disposti uniformemente e quasi regolarmente. Scagliette lisce, bene sviluppate. Nervature alari bruno ocra, stigma concolore, subcosta nera.

Peziolo assai corto e largo, con un incavo evidente al mezzo del margine distale: il secondo segmento di un terzo circa più lungo dei tre seguenti, che sono subeguali. Al margine distale dei primi cinque segmenti una stria ocracea subtrasparente che, sui primi quattro, forma al mezzo un piccolo triangolo. Punti radi, irregolarmente disposti, grandi circa quanto quelli della parte laterale del segmento mediano; fondo quasi completamente liscio, lucente. Campo pigidiale lungo e relativamente largo, appena trapezoidale, cioè a margini laterali quasi rigorosamente paralleli, appena un po' ravvicinati distalmente, ben rilevati; la superficie leggermente convessa, con la parte distale più scura, un po' rialzata, a margine tagliente, subsinuoso. Pennelli laterali evidenti. Scultura longitudinalmente rugosa con le rughe che divengono più fini e tendono a reticolarsi sulla parte distale: fondo lucente, micropuntato-reticolato.

Mesopleure con una sporgenza a piramide sul mezzo del margine ventrale. Punti mediocri con spazi da due volte a due volte e mezzo più grandi del loro diametro, su fondo microrugoso. Metapleure con una sutura obliqua al mezzo, rugose-striate trasversalmente. Meso e metasterno a fondo liscio, con punti come sulle pleure. Il secondo segmento ventrale senza rilievo al margine prossimale, tutti i segmenti a fondo liscio, con punti grandi, radi, superficiali. Ultimo segmento visibile con incavo mediano piccolo, apofisi laterali larghe e corte, incurvate un poco a doccia sui lati. Peli bianchi, relativamente scarsi su tutto il corpo.

♂. — Lunghezza 9.5 - 12 mm. — Molto simile alla ♀ per l'aspetto generale, per il tòno del colore e per la distribuzione delle macchie nere. In alcuni esemplari l'area cordata è annerita.

La faccia è molto più stretta e allungata che nella ♀; la parte media del clipeo, leggermente convessa, è poco meno che due volte più alta che larga, a margine libero appena convesso; la faccia nel suo insieme è pianeggiante. Convergenza dei margini oculari e rapporti di distanza fra ocelli ed occhi come nella ♀. La scultura relativamente fina, ma assai più profonda e fitta che nella ♀ su tutta la testa, clipeo compreso. Mandibole con un dente semplice all'unione fra il quarto prossimale e i tre quarti distali del margine mediale. Le antenne quasi cilindriche, con l'ultimo articolo incurvato, solcato ventralmente, tronco, la troncatura incavata, col bordo inferiore quasi denti-

forme. Il torace rassomiglia a quello della ♀, anche l'area cordata è liscia, solcata longitudinalmente al mezzo. Le zampe, più sottili e meno spinose di quelle della ♀, sono simili a queste per i rapporti di lunghezza dei tarsi e sono più spinose che nella media dei ♂♂ del genere *Cerceris*. Scagliette e ali come nell'altro sesso. La scultura del torace è più fitta e profonda che nella ♀.

Addome molto simile a quello della ♀, con la scultura più fitta e profonda. Campo pigidiale nettamente trapezoidale, lucente, con punti simili a quelli dei tergiti per grandezza, ma meno profondi, radi, irregolarmente disposti, quasi assenti al mezzo. Margini rilevati, superficie pianeggiante, lucente, senza microscultura, solo leggermente ondulata verticalmente; margine libero tagliente, quasi rettilineo.

Pleure e sterniti a punti molto più fitti che nella ♀; sulle mesopleure è visibile il solco trasversale e si nota anche una leggera traccia del rilievo al mezzo del margine ventrale. Gli sterniti addominali sono molto più fittamente punteggiati che nella ♀, la parte scolpita è ristretta al mezzo, dove è ricca di peli e forma sui lati di ciascun segmento a cominciare dal secondo un netto rilievo smusso. Tutto il corpo molto più peloso che nella ♀.

Si distingue dalle altre specie di questo gruppo per la statura relativamente grande; nei due sessi per la forma e la scultura del collare e dell'area cordata e soprattutto per i rapporti di lunghezza dei tarsi e la ricchezza in spine delle gambe; nella ♀ anche per la forma del clipeo e dell'area pigidiale.

Non rara sui margini del deserto nei dintorni del Cairo, compare in Maggio e Giugno.

8. — C. pruinosa Morice

Il Morice ha descritto la ♀ nel 1897 d'Egitto, il ♂ nel 1911 d'Algeria. I caratteri dei miei esemplari corrispondono alla sua descrizione; solo la pruinosità sui lati della testa e sulla parte distale dei tergiti non è ben visibile, ma si tratta di un carattere così labile che non credo che questa differenza possa render dubbia l'identificazione.

♀. — Lunghezza 10-11,5 mm. — Aspetto generale opaco per l'abbondante microscultura sparsa su tutto il corpo. Il colore è giallo paglierino chiaro. Le macchie nere sono assai scarse, in un esemplare si riducono ad una sola includente gli ocelli.

Margini oculari assai divergenti, la distanza all'ocello anteriore sta alla distanza al clipeo come 17 a 21. La distanza interocellare, misurata, è eguale alla distanza fra ogni ocello e l'occhio corrispondente. Le mandibole sono assai tozze; portano un unico dente ottuso al limite fra il quarto distale e i tre quarti prossimali del margine mediale, che è leggermente ondulato verso il mezzo. Clipeo largo, la parte media alta quanto larga, piano nella metà superiore, leggermente convesso sulla metà inferiore, col margine distale molto più largo del prossimale, leggermente concavo, terminato da un piccolo

rilievo sui lati. Lati della faccia pianeggianti, il solco d'inserzione delle antenne mediocre. Carena interantennare corta e piatta al mezzo come in *lutea* Taschbg. Occipite e tempie più sviluppati che in *lutea* Taschbg. Antenne quasi cilindriche, l'ultimo articolo conico. Scultura del clipeo e della faccia coperta da una fitta pubescenza argentea; dove è visibile consiste in piccoli punti radi e superficiali. Vertice, occipite e tempie a punti ben visibili, mediocri, fitti, gli spazi non maggiori del loro diametro.

Collare a punti simili a quelli del vertice, leggermente incavato al mezzo, con un rilievo arrotondato appena accennato posteriormente sui lati. Dorsulo quasi due volte più largo che alto, la larghezza al margine superiore delle scagliette sta alla massima altezza come 42 a 26, a punti più grossi che il vertice, bene individuati, più radi al mezzo che ai lati. Scutello e postscutello larghi e relativamente stretti, a punti radi, più piccoli sul postscutello. Area cordata a triangolo isoscele, a solco longitudinale mediano evidente, con pochi punti larghi e superficiali, opaca, a fondo microrugoso. Lati del segmento mediano a punti grandi quanto sul vertice, fitti, in parte confluenti, su fondo microrugoso-reticolato. Sul resto del dorso del torace il fondo è micro-reticolato-puntato.

Zampe modicamente pubescenti, non eccessivamente spinose. Il pettine del metatarso anteriore ha 7-8 spine corte, piuttosto sottili. Apparecchio di toeletta delle tibie anteriori ordinario. Femori lisci, con pochi peli corti argentei. Zampe allungate, rapporti di lunghezza della tibia e dei tarsi posteriori come 48-28-12-10-6-11. Tibie posteriori con 9 spine al margine esterno (comprese le due terminali), sprone grosso, assai corto. Pulvilli mediocri. Scagliette lisce, bene sviluppate; nervature alari rosso ocra, passanti al bruno distalmente; stigma rosso ocra, subcosta nera.

Peziolo corto e stretto; il secondo a quinto segmento larghi, a punti modicamente grossi, fitti, bene individuati, su fondo microstriato, i margini distali retti, appena linearmente oscurati. Campo pigidiale largo e lungo, nettamente piriforme, a superficie pianeggiante, i margini leggermente rilevati, a microreticolazione senza macroscultura, opaco, infuscato all'apice; peli marginali bene evidenti, pennelli terminali scarsi.

Mesopleure punteggiate come i lati del segmento mediano, senza rilievo dentiforme. Mesosterno scolpito come le mesopleure. Metasterno tutto ricoperto di una fine pubescenza argentea. Il secondo sternite porta un rilievo basale evidente, largo, ma pochissimo rialzato, limitato da una linea netta, liscio. Gli sterniti hanno punti assai grossi e fitti, limitati alla metà distale; la metà prossimale porta solo la micropuntuazione che si continua come fondo anche sulla parte punteggiata. Il penultimo sternite è rilevato sui lati. Pilosità argentea assai abbondante. L'ultimo sternite visibile ha l'incavo mediano stretto e profondo, giungente fino alla sua metà, e corrispondentemente le apofisi laterali lunghe e strette.

♂. — Lunghezza 9 mm. — Come lo ha osservato il Morice, in questa specie il dimorfismo sessuale è ridotto al minimo. La puntuazione è un poco più accentuata che nella ♀ soprattutto al torace e sull'area cordata. La parte media del clipeo è alta e relativamente larga, nettamente convessa, col margine libero rettilineo, le parti laterali strette, con frangia di peli rossastri evidente al margine libero. Pubescenza argentea ben visibile. Antenne leggermente clavate : la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 9 sta a 14. L'ultimo articolo è corto, conico. Sugli sterniti la puntuazione è un poco più forte e estesa che nella ♀ ; il quinto e sesto segmento ventrale portano entrambi il rilievo laterale. Il campo pigidiale ha margini leggermente curvi che si restringono un poco verso l'alto, superficie pianeggiante, fondo microreticolato con punti assai abbondanti, margine libero quasi retto, tagliente, sottilmente oscurato.

Questa specie si distingue facilmente dalle altre del gruppo per la statura relativamente grande, il colore chiaro e l'aspetto generale opaco, la forma del collare e, nella ♀, per i caratteri distintivi del sesso.

Piuttosto rara. Nella mia collezione sono 4 ♀♀ e 1 ♂, tutti dell'Wadi Hof, catturati fra il Maggio e il Luglio.

9. — C. pharaonum Kohl

♀. — Lunghezza 7-9 mm. — Su cinque esemplari della mia collezione, in tre l'addome tende nettamente al rosso ocra, negli altri due è di un giallo più carico dei disegni dell'addome ; anche le zampe tendono al rossastro, sopratutto quelle delle due paia posteriori. Antenne oscurate al disopra a partire dal 4° o 5° articolo del funicolo.

Margini oculari quasi paralleli : la distanza all'ocello superiore sta alla distanza al clipeo come 15 a 14. La distanza fra i due ocelli è eguale a quella fra ciascun ocello e il margine oculare corrispondente. Mandibole senza denti, ondulate sul margine mediale. Parte media del clipeo quasi quadrangolare, nettamente convessa ; all'unione del quinto distale coi quattro quinti prossimali porta due denticoli piramidali che lasciano fra loro uno spazio libero al mezzo ; due linee verticali tirate dall'apice dei denticoli dividono la parte media del clipeo in tre sezioni quasi eguali. Al disotto questa parte discende verso il margine libero che è leggermente ondulato. Parti laterali del clipeo piccole. Lati della faccia pianeggianti, solco d'inserzione delle antenne superficiale. Carena interantennare mediocre, ben tagliente. Occipite e tempie mediocri. Antenne clavate : la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 9 sta a 13. Clipeo e carena a micropunteggiatura, con scarsissimi macropunti piccoli e superficiali ; lati della faccia micropuntato-striati con punti superficiali un po' più abbondanti. Vertice, occipite e tempie con punti più grandi e più fitti, con tendenza a striatura longitudinale nella regione che dagli ocelli scende verso la faccia, senza microscultura di fondo.

Collare non incavato al mezzo, con un dente smusso posteriormente e ai lati. Punti meno fitti che al vertice, della stessa grandezza. Dorsulo subquadrangolare, liscio e lucente, a punti radi, assai grandi; la stessa scultura sullo scutello; il postscutello a punti piccolissimi. Area cordata a triangolo equilatero, con solco mediano longitudinale poco evidente in alcuni esemplari, liscia, lucente, convessa. Lati del segmento mediano a punti piccoli ma bene impressi, assai radi: gli spazi da tre a quattro volte maggiori del loro diametro.

Metâtarso anteriore con sei spine relativamente lunghe al pettine. Le spine delle zampe relativamente abbondanti. Tibie posteriori con 9-10 spine al margine esterno (comprese le due terminali). Le zampe sono corte come in *sulcipyga* nov. spec. e in *lutea*. Rapporti di lunghezza fra la tibia e i tarsi posteriori come 42-20-9-6-4-7, quindi i tarsi relativamente corti. Il metatarso intermedio porta una fitta frangia di peli bianchi lunghi già notata dal Kohl. Segmento ungueale piuttosto corto, unghie piccole, pulvilli assai sviluppati. Scagliette lisce, nervature alari bruno-ocra, costa e stigma giallo-ocra tendente al rossastro.

Peziolo subquadrangolare. I tergiti hanno i margini linearmente oscurati, espansi a piccolo triangolo al mezzo; sono lucenti, con microreticolazione di fondo appena accennata, a punti un po' più grossi che sui lati del segmento mediano, con spazi da una e mezzo a due volte il loro diametro, tendenti a divenir più radi sui segmenti distali. Campo pigidiale grande, trapezoidale, a base larga in alto, quasi esagonale perché i due angoli distali sono un po' smussi, a estremo apice linearmente oscurato, a fondo piano, microrugoso con qualche punto superficiale sui lati e lungo la base; i lati poco rilevati senza ciglia evidenti, pennelli terminali poco sviluppati.

Lato ventrale della testa e prosterno lisci, a marmoreggiatura raggiata. Mesopleure punteggiate come i lati del segmento mediano, con un denticolo appena visibile al mezzo della superficie laterale. Mesosterno e metasterno lisci, con punti piccoli e sparsi. Sterniti addominali lisci e lucenti, il secondo senza rilievo basale, gli altri con punti scarsi, un po' più abbondanti sul quarto e quinto. Ultimo sternite visibile quasi senza incavo mediano, con le apofisi corte, ottuse, quasi foliate.

♂ (? inedito). — Attribuisco a questa specie una serie di ♂♂ che presentano i seguenti caratteri:

Lunghezza: 7-9 mm. — L'addome è di colore generalmente più carico dei disegni del torace a in alcuni esemplari tende nettamente al rosso ocra. Il clipeo è modicamente allungato, leggermente trilobato sul margine libero, lucente, poco convesso, con pochi punti superficiali su fondo microrugoso. Lo scapo delle antenne è più corto del primo e secondo articolo del funicolo insieme, l'articolo terminale è leggermente curvo, troncato. I lati della faccia presentano abbondante pubescenza argentea. Le tempie sono poco sviluppate.

I rilievi posti posteriormente ai lati del collare sono più acuti e più sviluppati che nella ♀. Scultura del torace e area cordata come nella ♀. La serie di peli argentei sul metatarso intermedio è presente ma assai meno sviluppata che nell'altro sesso. La tibia posteriore è annerita all'apice dal lato mediale. Il metatarso posteriore è corto come nell'altro sesso.

L'addome nel suo insieme è assai stretto; il peziolo è subquadrangolare. La scultura dei tergiti è più profonda e fitta che nella ♀, a fondo liscio, manca il piccolo triangolo al margine distale al mezzo. L'area pigidiale è leggermente trapezoidale, a margine libero tagliente, leggermente convesso, con numerosi punti bene scolpiti su fondo liscio.

La specie si distingue nei due sessi per il rilievo spiniforme sui lati del collare, par la tendenza al rossastro dell'addome, per l'aspetto generale snello, per le zampe corte; nella ♀ per i rilievi del clipeo e par la forma dell'area pigidiale.

Non molto comune, caratteristica della bordura del deserto. Nella mia collezione 9 ♂♂ e 5 ♀♀, catturati dalla fine di Marzo ai primi di Giugno.

10. — C. pulchella Klug

Il colore è giallo paglierino chiaro al torace; in molti esemplari un po' più carico all'addome. Le macchie nere alla testa e al torace non sono in generale molto abbondanti. Le zampe non sono più scure del resto del corpo, le antenne leggermente infuscate al disopra. Nervature ocracee, subcosta nera, stigma ocraceo chiaro.

♀. — Lunghezza 7-8 mm. — Margini oculari paralleli. La distanza fra i due ocelli posteriori sta a quella fra ciascun ocello e l'occhio corrispondente come 10 sta a 7. Le mandibole hanno un solo dente appuntito al margine mediale, all'unione del quarto distale coi tre quarti prossimali; il resto del margine non è ondulato. La parte media del clipeo, poco più alta che larga, è piana sul suo terzo prossimale; a questa altezza si inizia un incavo ovalare centrale contornato a ferro di cavallo dalle parti circostanti; il margine libero è quasi rettilineo. Tutto il clipeo è riccamente coperto di pubescenza argentea che, sui lati, cuopre completamente la scultura; dove è visibile, questa è costituita da una fittissima micropuntuazione con scarsi punti maggiori piccoli e superficiali. Carena interantennare alta e ben tagliente. Occipite e tempie bene sviluppati, a punti piccoli ma bene impressi e fitti, subconfluenti al dinanzi degli ocelli, con spazi non o di poco maggiori del loro diametro sul resto. Il secondo articolo del funicolo è lungo quanto il terzo. Antenne clavate: il margine distale del secondo articolo del funicolo sta al margine prossimale del penultimo come 9 sta a 13.

Collare a punti piccoli e sparsi, nettamente incavato al mezzo, con un grosso rilievo ottuso ai due lati. La massima larghezza del dorsulo sta alla

sua altezza come 28 sta a 20; superficie liscia e lucente con punti assai grandi bene individuati in avanti e sui lati, quasi del tutto assenti al mezzo. Scutello largo, liscio, quasi senza punti, come il postscutello. Area cordata a triangolo isoscele col solco longitudinale mediano poco profondo, liscia al mezzo, a solchi paralleli sulla parte basale e sui lati, con una fossetta all'apice. Lati del segmento mediano a punti meno fitti intorno all'area cordata, nel resto a punti quasi due volte più grandi di quelli del vertice, distanti da una a due volte il loro diametro, su fondo microreticolato.

Pettine del metatarso anteriore a 6-7 spine chiare, mediocri. Tibie posteriori con 7 spine chiare, mediocri, al margine esterno. Rapporti di lunghezza della tibia e dei tarsi posteriori: 30-20-8-7-4-6. Unghie assai lunghe, pulvilli piccoli.

Peziolo stretto, subquadrangolare, col margine distale largo meno della metà di quello del secondo segmento. I margini distali dei tergiti linearmente arrossati, retti. Punti grossi quanto sui lati del segmento mediano o un po' di più, fitti, gli intervalli inferiori al loro diametro, su fondo a microreticolazione molto leggera, lucido. Campo pigidiale ovoidale, rosso ocra, oscurato all'apice, a superficie piana irregolarmente solcata sulla parte prossimale, con solchi paralleli disposti radialmente al margine sul terzo distale; fondo fittissimamente e regolarmente microreticolato. Margini laterali leggermente rilevati, ciglia laterali evidenti, pennelli terminali poco sviluppati.

Lato ventrale della testa e prosterno lisci, a marmorizzazione raggiata. Mesopleure a punti un po' più fitti che sui lati del segmento mediano, con un dente spiniforme bene accentuato sulla parte distale del margine laterale; mesosterno finemente microreticolato, a punti piccoli molto scarsi; metasterno irregolarmente microrugoso senza punti. Secondo sternite addominale lucente, con microreticolazione irregolare poco visibile e pochissimi punti verso il margine distale, munito alla base di un rilievo evidente. Gli altri sterniti con la stessa microscultura e punti scarsi sopratutto distalmente e sui lati. Il penultimo sternite leggermente rilevato sui lati. Pilosità argentea più sviluppata sui segmenti distali. L'ultimo sternite visibile con incavo mediano evidente, le apofisi laterali coniche, appuntite.

♂. — Lunghezza 5,5-7 mm. — Margini oculari quasi paralleli; distanza degli ocelli fra loro eguale a quella fra ciascun ocello e l'occhio corrispondente. Mandibole a margine mediale appena ondulato. Clipeo leggermente convesso, microreticolato-puntato, senza macroscultura o quasi, a margine libero quasi retto, i lati a pubescenza argentea. Lati della faccia pianeggianti e pubescenti, microscolpiti come il clipeo, a macropunti piccoli, superficiali, sparsi; solco dell'inserzione antennare poco accentuato. Vertice, tempie e occipite scolpiti come nelle ♀♀, articoli basali delle antenne come in queste, articolo terminale conico, appena più lungo del penultimo. Gli articoli portano una finissima frangia ventrale visibile solo a forte ingrandimento. Torace come nella ♀,

con la scultura un poco più grossa e fitta. Lo stesso all'addome. Zampe più snelle e meno ricche di spine che nella ♀. Campo pigidiale leggermente trapezoidale con la base larga in basso, i margini laterali ben rilevati, la superficie un po' concava distalmente, a grossi punti su di un fondo microreticolato, lucente, chiaro, con soltanto un oscuramento lineare distale privo di punti prima del margine libero che è tagliente, retto. Lato ventrale come nella ♀ ; manca la spina sulle mesopleure ; ben visibile il rilievo basale sul secondo sternite addominale ; scultura nell'insieme un po' più accentuata. Sterniti addominali ciliati di bianco.

Si distingue dalle altre specie del gruppo nei due sessi per la forma del collare e la scultura della testa e del torace ; nella ♀ per la forma del clipeo.

Specie caratteristica della bordura del deserto, non rara fra la fine di Aprile e i primi di Giugno.

11. — C. pallidula Morice

Colorito di fondo pallido, in alcuni esemplari quasi crema. Macchie nere non molto abbondanti alla testa e al torace. I margini distali dei tergiti linearmente anneriti. Scapo giallo, funicolo rosso-ocra oscurato al disopra. Zampe gialle. Nervature alari bruno-ocra, stigma bruno, subcosta nera.

♀. — Lunghezza 9,5 mm. — Margini oculari paralleli. Gli ocelli distano fra loro appena un po' meno che ciascuno dall'occhio corrispondente. Mandibole a margine mediale tagliente, non ondulato. Clipeo largo, la parte media alta quanto larga, convessa, col margine libero retto, più corto della distanza che separa i due angoli donde si distaccano le parti laterali superiormente, quindi tendente a restringersi in basso. Tutto il clipeo coperto di pubescenza argentea che cuopre la scultura ; questa, in quanto visibile, formata di microrughe, con una serie di punti paralleli al margine libero, vicino a questo. Lati della faccia appena convessi, riccamente pubescenti, microrugosi, con punti superficiali assai fitti, il solco di inserzione delle antenne quasi assente. Carena interantennare alta e tagliente. Fronte, vertice, occipite e tempie a punti di media grandezza, su fondo liscio, fitti, gli spazi minori del loro diametro. Antenne clavate : il margine distale del secondo articolo del funicolo sta al margine prossimale del penultimo come 10 sta a 14 : il secondo e terzo articolo del funicolo di lunghezza quasi eguale, di poco più lunghi del primo ; l'articolo terminale conico, leggermente incavato all'apice, di poco più lungo del penultimo.

Il collare, a punti meno fitti del vertice, è nettamente insellato al mezzo con un grosso rilievo ottuso da ciascun lato. Dorsulo largo, a punti un po' più grossi di quelli del vertice, meno fitti, uniformemente disposti. Scutello e postscutello quasi impuntati, tutte queste parti senza scultura di fondo. Area cordata a triangolo isoscele, con solco longitudinale mediano poco im-

presso, liscia, con una serie di strie parallele corte perpendicolari ai lati; anche il solco mediano orizzontalmente striato. Latì del segmento mediano a punti più piccoli che sul dorsulo, assai radi: gli spazi da una a tre volte il loro diametro.

Zampe piuttosto corte, metatarso anteriore con sette spine chiare, corte e tozze al pettine. Tibie posteriori con cinque spine (senza contare il ciuffo terminale e il basale) su rilievi bene accentuati. Relazioni di lunghezza della tibia e tarsi posteriori: 35-21-9-7-5-9. Sprone sottile, chiaro. Unghie lunghe, pulvilli normali. Scagliette lisce.

Peziolo quasi due volte più largo che lungo, il suo margine distale largo la metà di quello del segmento seguente. Margini dei tergiti retti. Scultura un po' più fitta che sui lati del segmento mediano, omogenea, su fondo finemente microreticolato. Campo pigidiale lungo e stretto, piriforme, rosso-ocra con l'apice nero, a strie-rughe irregolari, tendenti a disporsi perpendicolarmente ai margini laterali, sul terzo distale reticolato-rugoso, a margini poco rilevati, a superficie pianeggiante, un po' concava sulla parte distale, con peli marginali lunghi, pennelli terminali corti e fitti.

Lato ventrale della testa liscio, appena radialmente marmorizzato. Prosterno microrugoso, con un rilievo a carena trasversale, separante il terzo inferiore dai due terzi superiori, obliquante in alto verso il lato. Mesopleure non dentate, a scultura simile a quella dei lati del segmento mediano, che si continua identica sul mesosterno, su fondo microreticolato. Metasterno longitudinalmente microstriato, a pubescenza argentea scarsa. Il secondo segmento addominale ventrale senza un vero rilievo basale, solo col margine prossimale rialzato a carena trasversale subito al davanti dell'inserzione del primo sternite, delimitante così una strettissima area rilevata. Sterniti a fondo microreticolato, con punti radi sulla parte distale, i due penultimi frangiati di peli argentei. Incisione mediana dell'ultimo sternite visibile larga e poco profonda, apofisi laterali sottili.

♂. — Analogo alla ♀ per i rapporti di lunghezza degli articoli del funicolo, la forma del collare, la scultura dell'area cordata, la forma del peziolo. Il clipeo è un po' più largo che in *pulchella* Klug ♂ con punti fitti quasi come sui lati della faccia; del resto la testa come nella ♀, solo più fittamente scolpita. Torace come nella ♀, scultura più accentuata e fitta, punti ben visibili sullo scutello e sul post-scutello. Anche all'addome i punti più fitti che nella ♀. Campo pigidiale trapezoidale coi lati e il margine libero leggermente convessi, punteggiato quasi come i tergiti. Zampe più sottili e più snelle che nella ♀, ali come in questa. Lato ventrale come nella ♀, accennati la carena sul prosterno e il piccolissimo rilievo sul secondo segmento ventrale dell'addome. Pilosità degli sterniti scarsa.

Specie distinta per la forma del collare, la scultura dell'area cordata, il

peziolo corto e largo, l'assenza quasi completa del rilievo sul secondo segmento ventrale.

Tutti i miei esemplari (1 ♀ e 6 ♂♂) provengono dal Gebel Asfar, da fine Aprile ai primi di Giugno.

12. — C. Priesneri nov. spec.

♀. — Lunghezza 9-11 mm. — Margini oculari paralleli. Ocelli disposti a triangolo ottusangolo, i posteriori distanti fra loro quanto dall'occhio corrispondente. Mandibole con un rilievo angolare all'unione del terzo distale coi due terzi prossimali del margine interno. Parte media del clipeo circa due volte più larga delle parti laterali, non molto alta, piana superiormente, rialzantesi in basso a piramide piatta, terminata da un tubercolo mediano subito al disopra del margine libero; questo quasi retto, limitato ai lati da un piccolo tubercolo. Margine libero delle parti laterali convesso. Lati della faccia pianeggianti, solco dell'inserzione antennare poco incavato. Carena interantennare corta, tagliente. Occipite e tempie bene sviluppati. Antenne nettamente clavate : la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al margine prossimale come 6 sta a 10. Clipeo e faccia a microscultura puntato-rugosa, con pochi macropunti piccoli, superficiali, sparsi. Vertice e tempie a punti mediocri, modicamente fitti, su fondo liscio.

Collare punteggiato come il vertice, quasi senza incavo mediano, con le spalle arrotondate, un po' rilevate. Al disotto del collare, ai due lati, il pronoto porta un rilievo spiniforme. Dorsulo di poco più largo che alto (l'altezza sta alla larghezza a livello delle scagliette come 50 sta a 65), a fondo liscio, con punti più grandi che sul vertice, molto scarsi. Scutello liscio, a punti più piccoli che sul vertice, molto sparsi; postcutello a punti più piccoli ma più fitti. Area cordata a triangolo acutangolo, liscia, col solco mediano bene impresso e una serie di impressioni parallele ai margini laterali. Lati del segmento mediano con accenno a microstriatura trasversale, a punti staccati, meno fitti in vicinanza dell'area cordata.

Zampe di lunghezza ordinaria, mediocremente spinose. Pettine con sei spine oltre le due terminali, apparecchio di toelette del tipo medio. Tibie posteriori con 5 spine al lato esterno, su tubercoli assai sviluppati. Rapporti di lunghezza della tibia e dei tarsi posteriori : 40-23-9-8-5-9. Unghie e pulvilli normali. Anche anteriori leggermente coniche. Scagliette lucenti, assai grandi.

Peziolo corto e largo come in *pallidula* Morice, con punti piccoli, diseguali, sparsi, su fondo liscio. Gli altri tergiti a punti più grossi e più fitti, con fondo a leggera microreticolazione. Campo pigidiale ovoidale, rugoso-striato, piano, a margini poco rilevati.

Mesopleure a mesosterno a puntuazione più fitta che sui lati del segmento mediano, le mesopleure con una forte spina al mezzo del margine latero-esterno. Secondo sternite con rilievo triangolare bene sviluppato, gli

sterniti a puntuazione simile a quella dei tergiti, un po' meno fitta. Ultimo sternite visibile con apofisi piatte, mediocri, il solco mediano profondo.

♂. — Lunghezza 8 mm. — Molto simile alla ♀, solo tutta la scultura assai più grossa e più fitta, i solchi radiali sul segmento mediano più sviluppati. Parte media del clipeo larga e assai alta, convessa, scolpita come nella ♀. Il secondo articolo del funicolo un poco più lungo che nella ♀, le spalle del collare un poco più rilevate. Campo pigidiale rettangolare, punteggiato. Manca la spina laterale alle mesopleure. Pilosità bianca un poco più sviluppata che nell'altro sesso.

Mentre la ♀ si differenzia subito dalle specie affini per la forma del clipeo, è assai più difficile distinguere il ♂. Da *pallidula* Morice e *pulchella* Klug si differenzia par la maggior lunghezza del secondo articolo del funicolo e per il collare non infossato al mezzo; in *pruinosa* Morice il collare è simile per forma, ma la scultura è molto più profonda e fitta sopratutto sullo scutello e il postscutello e sui lati del segmento mediano e inoltre l'area cordata è punteggiata e non liscia e il rilievo sul secondo sternite è quadrangolare e poco rialzato invece che triangolare e forte. È invece molto difficile distinguere *Priesneri* nov. spec. ♂ da *Alfierii* nov. spec. ♂. Forma del collare, area cordata, scultura sono molto simili. Anche in *Priesneri* nov. spec. il lato ventrale della testa è punteggiato, ma molto meno che in *Alfierii* nov. spec.: le anche anteriori non portano punti, le scagliette solo due o tre; il rilievo sul secondo sternite è più accentuato in *Priesneri* nov. spec., il secondo articolo del funicolo più lungo. La spinula ai lati del pronoto esiste, ma è più piccola che nella ♀ e difficile a vedere.

Tipo ♀ : Abu Rawash, 22 Maggio 1938.

Tipo ♂ : Abu Rawash, 24 Giugno 1938.

La specie non sembra comune. Si trova con le altre simili sui margini del deserto nei mesi estivi.

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Le due specie che seguono stanno ai limiti fra quelle a colore prevalentemente giallo e quelle con l'addome almeno macchiato di scuro. Mi sembra indubitabile che i numerosi esemplari che ho avuti sotto gli occhi si raggruppino intorno a due tipi specifici, le variazioni di colore essendo accidentali o rappresentando mutamenti locali. Quello che mi ha spinto a non suddividerli in specie diverse e a considerare due forme come varietà è stata la costanza dei caratteri anatomici e sculturali, alcuni dei quali sono veramente caratteristici.

È quasi certo che, sotto l'uno o l'altro dei loro aspetti cromatici, queste due specie siano state già descritte da altri autori, ma l'identificazione mi è stata impossibile sulla base dei dati bibliografici a mia disposizione, per cui ho dovuto decidermi ad impiegare nuovi nomi. Spero che le abbondanti illus-

trazioni o eventualmente il confronto coi tipi possano servire in futuro a togliere ogni ambiguità ed a risolvere il problema anche dal punto di vista della nomenclatura.

13. — C. Alfierii nov. spec.

♀. — Lunghezza 8-9 mm. — Distribuzione dei colori come nelle specie precedenti. Tòno del giallo come in *pulchella* Klug. Le antenne appena più scure del resto del corpo, non oscurate al disopra. Le zampe giallo chiaro come il corpo. Nervature alari ocra chiaro, stigma concolore. I tergiti linearmente oscurati al margine distale.

Margini oculari paralleli; distanza degli ocelli fra loro eguale alla distanza di ciascun ocello dall'occhio corrispondente. Mandibole non dentate. Clipeo a pubescenza argentea: la parte media subquadrangolare, col margine distale retto; la superficie piana in alto, infossata a cominciare da un poco al disopra della metà dell'altezza, l'infossatura più profonda vicino al margine distale. Lati della faccia pianeggianti, solco dell'inserzione antennare poco profondo. Occipite e tempie bene sviluppati. Tutta la testa a scultura fitta, quasi reticolata, su fondo liscio, salvo sul clipeo e sulle parti della faccia immediatamente vicine dove il fondo è micropunteggiato. Carena interantennare tagliente, bassa. Il secondo articolo del funicolo di un terzo più lungo del terzo, l'ultimo conico, di un terzo più lungo del penultimo.

Collare a scultura poco meno fitta che sul vertice, a margine anteriore appena un po' concavo, con le spalle leggermente rilevate, senza incavo mediano. Dorsulo a punti due volte più grandi di quelli del vertice, bene impressi, distanti fra loro da una a una volta e mezzo il loro diametro, quasi uniformemente distribuiti, su fondo microreticolato. Scutello a punti come sul vertice, bene impressi, irregolarmente distribuiti, relativamente fitti, su fondo a microreticolazione finissima; i punti del postscutello della metà minori, ben visibili, su fondo simile. Area cordata a triangolo equilatero, con fossetta apicale profonda, la linea longitudinale mediana formata da grossi punti confluenti, radialmente striato-puntata sui lati, a fondo microreticolato. Scultura dei lati del segmento mediano reticolato-puntata, a punti staccati soltanto presso l'area cordata.

Tarsi anteriori con sei spine sottili, lunghe, quasi trasparenti. Apparecchio di toelette delle tibie anteriori del tipo lungo. Tibie posteriori con 7 spine al margine esterno (senza contare i due gruppi apicale e basale). Rapporti di lunghezza della tibia e tarsi posteriori: 32-20-9-7-5-8. Tutte le zampe argenteo-pruinose. Anche anteriori con una sporgenza conica scolpita lateralmente. Scagliette a fondo microreticolato con punti staccati della grandezza di quelli del collare, bene impressi, assai abbondanti.

Peziolo più lungo che largo; il suo margine distale largo meno della metà di quello del segmento seguente; i margini dei tergiti retti. Tutti i

tergiti a punti grandi quanto quelli dei lati del segmento mediano, fitti, quasi confluenti. Campo pigidiale non molto largo, ovalare, a margine distale subtroncato, a fondo piano, di colore ocraceo, regolarmente e nettamente microreticolato, con punti netti assai abbondanti, grandi e superficiali; i lati poco rilevati, le ciglia laterali scarse, i pennelli bene evidenti.

Lato ventrale della testa e prosterno a punti piccoli, piuttosto radi (distanti da due a tre volte il loro diametro); il prosterno con una corta carena trasverso-obliqua sui lati, al limite fra il quarto basale e i tre quarti apicali. Mesopleure scolpite come i lati del segmento mediano, mesosterno a punti meno fitti, staccati. Metasterno a microstriatura longitudinale, con punti sparsi. Rilievo basale sul secondo sternite piccolo ma assai rialzato; tutti gli sterniti a punti grossi, bene impressi, staccati, più fitti sul penultimo. Incavo dell'ultimo sternite visibile piccolo, assai largo, le apofisi laterali appuntite.

♂. — Lunghezza 5,5-8 mm. — Più frequenti gli esemplari oscurati, in alcuni il margine distale dei tergiti è annerito invece che ocraceo; spesso i femori sono anneriti medialmente, ma i tarsi sono sempre gialli. Antenne rossastre, oscurate al disopra. La scultura è distribuita come nella ♀, ma è un po' più grossa. Come nell'altro sesso, le anche anteriori presentano la dilatazione conica scolpita, il lato ventrale della testa e il prosterno sono punteggiati, le scagliette pure; visibile la piccola carena del prosterno. Clipeo col margine libero leggermente ondulato, assai ristretto in alto, a puntuazione fortissima. Antenne leggermente clavate, l'ultimo articolo non più lungo del penultimo, troncato obliquamente all'apice. Nervature alari e stigma più scuri che nella ♀. Campo pigidiale stretto, a margini leggermente convessi, ben rilevati, subrettangolare, col margine libero linearmente oscurato, retto, a punti grossi, fitti, bene impressi. Lato ventrale come nella ♀ salve le differenze sessuali, sterniti ristretti al mezzo, un po' dilatati sui lati, fortemente puntati.

Insieme agli esemplari di colore uniformemente giallo, impossibili a distinguere da quelli delle specie precedenti senza un esame dei caratteri strutturali, se ne trovano altri che presentano un disegno caratteristico assai costante, facile a distinguere a prima vista, ma che, esaminati a forte ingrandimento, non si possono in alcun modo differenziare da quelli finora descritti per la scultura e per gli altri caratteri, compresa la forma del clipeo e del campo pigidiale della ♀, la punteggiatura forte del lato ventrale della testa e del prosterno, i punti sulle scagliette, la forma del rilievo sul secondo sternite. Per il colore si veda la figura. Il giallo è molto più chiaro che negli esemplari tipici, tendente al biancastro, l'addome ha i segmenti fasciati di nero; il color nero è più diffuso sul lato ventrale. Ritengo opportuno distinguere questa forma come una varietà fissa, benché non manchino i passaggi, col nome di var. *picta* nov.

C. Alfierii Alfierii nov. spec. : Tipo ♀, Mansurieh, 1° Agosto 1925.
C. Alfierii Alfierii nov. spec. : Tipo ♂, Gebel Asfar, 4 Giugno 1937.
C. Alfierii picta nov. var. : Tipo ♀, Saqqara, 28 Maggio 1933.
C. Alfierii picta nov. var. : Tipo ♂, Kerdassa, 5 Maggio 1935.

Questa specie è assai comune. La var. *picta* nov. sembra presentarsi in primavera, la forma tipica nei mesi più caldi. La maggior parte degli esemplari sia della mia collezione che di quella del Ministero di Agricoltura sono stati catturati nei mesi da Giugno a Settembre, sui margini del deserto.

14. — C. lateriproducta nov. spec.

♀. — Lunghezza 9-12 mm. — Pur conservando il tipo generale del disegno, alcuni esemplari del Gebel Elba (collezione del Ministero di Agricoltura) hanno le macchie chiare molto ridotte. Il clipeo, i lati della faccia e quasi tutta la carena interantennare gialli; mandibole gialle a punta nera; scapo giallo, antenne ocra, più scure al disopra. Anche, trocanteri e femori rossi, i femori del primo e secondo paio con una stria longitudinale gialla sul lato ventrale. Petto e pleure neri, calli omerali rossi. Sterniti addominali rossi, il secondo e terzo macchiati di giallo ai lati.

Margini oculari paralleli. Ocelli disposti a triangolo quasi equilatero, i posteriori distanti fra loro quanto dal margine oculare corrispondente. Parte media del clipeo più di una volta e mezzo più larga delle parti laterali, convessa, incavata a semiluna immediatamente al disopra del margine libero che è limitato da un tubercolo sui lati. Margine libero delle parti laterali quasi retto. Mandibole con tre denti al margine interno, il più vicino alla base quasi impercettibile, il mediano maggiore, il più distale molto grande. Lati della faccia pianeggianti, solco d'inserzione antennare assente. Carena interantennare corta e tagliente. Occipite e tempie bene sviluppati. Antenne clavate: la larghezza del secondo articolo del funicolo al margine distale sta a quella del penultimo al prossimale come 6 sta a 8. Tutta la testa a punti forti e fitti, più radi sul clipeo e sui lati della faccia, dove il fondo è micropuntato, più fitti e quasi confluenti verso il vertice e le tempie.

Collare a margini paralleli, con le spalle appena rilevate, a punti grossi e fitti. Dorsulo di dimensioni ordinarie, a punti quasi confluenti su microreticolazione di fondo. Scutello a punti egualmente grandi, molto più radi, postscutello a punti molto minori, entrambi a microreticolazione evidente. Segmento mediano a punti grandi, regolari, quasi confluenti, con micropuntuazione-reticolazione molto accentuata sul fondo. L'area cordata, a triangolo quasi equilatero, è appena distinta dalle parti laterali, poiché la puntuazione di queste si continua sui suoi lati e sul suo apice, mentre alla base e al mezzo resta solo la forte micropuntuazione-reticolazione.

Le zampe sono ricchissime di spine, tanto da ricordare *lutea* Taschbg. e *sulcipyga* nov. spec.; però, a differenza di quanto avviene in queste due

specie, i tarsi sono molto lunghi e l'apparecchio di toelette delle tibie anteriori è del tipo corto. Pettine con quattro spine (oltre le due terminali) molto forti e lunghe. Ciuffo di spine terminali delle tibie intermedie molto abbondante, come in *lutea* Taschbg.; tibie posteriori con 7 spine al margine esterno, su rilievi poco sviluppati. Rapporti di lunghezza fra la tibia e i tarsi posteriori: 35-19-9-7-4-6. Pulvilli piccoli. Anche leggermente coniche. Scagliette mediocri, lisce.

Peziolo largo e corto: la sua larghezza al margine distale sta a quella del secondo segmento allo stesso margine come 25 sta a 40. Porta un piccolo solco longitudinale al mezzo del margine distale, che si ripete sul secondo e terzo tergite. Scultura forte e fitta come sul dorsulo con microreticolazione di fondo so tutti i tergiti. Sui lati, all'angolo postero-inferiore, i tergiti secondo, terzo e quarto presentano un rilievo rivolto indietro caratteristico della specie. Campo pigidiale trapezoidale, la base maggiore distale, pianeggiante, a margini poco rilevati, a fondo microreticolato-puntato, con punti sparsi, profondi e netti.

Mesopleure e mesosterno reticolato-puntati, le prime con appena un accenno a spina laterale. Sterniti addominali a grossi punti sparsi su fondo microreticolato. Le apofisi dell'ultimo sternite visibile assai lunghe, il solco mediano largo.

♂. — Lunghezza 8-11 mm. — Differisce notevolmente dalla ♀ per il colore e per l'assenza quasi completa della microscultura di base, per cui appare, nell'insieme, più lucente. Del resto la scultura è analoga a quella della ♀, forse un poco meno forte. L'area cordata è scolpita come nell'altro sesso, ma dove in quest'ultimo appare la microscultura di base, nel ♂ la superficie è liscia e lucente. Le antenne sono clavate come nella ♀. Il clipeo è convesso, fortemente scolpito. Il campo pigidiale è rettangolare, a superficie lucente, riccamente punteggiata. I tergiti primo a quinto portano un incavo longitudinale al mezzo del margine distale come nella ♀; il rilievo caratteristico della specie all'angolo latero-inferiore si presenta sui tergiti secondo a quinto ed è accennato anche sul sesto. Gli sterniti portano lunghi peli eretti, bianchi. Nel complesso, l'insetto è notevolmente stretto e allungato, la strozzatura fra i segmenti addominali è scarsa, il peziolo è corto e quasi globoso. Le zampe contrastano con quelle della ♀ per la grande scarsezza di spine.

Accanto a questi esemplari se ne trovano altri che presentano, nei due sessi, tutti i caratteri strutturali e sculturali ora descritti, ma il cui colore è identico a quello del gruppo delle specie gialle. Non ho trovate forme di passaggio. Si tratta di due varietà ben distinte, forse di razze locali o stagionali. La forma tipica è più frequente al Gebel Elba e nella stagione più calda, la gialla nei dintorni del Cairo dove si trova fin dalla fine Maggio. Non sembrandomi lecito elevare a dignità di differenza specifica dei caratteri pura-

mente cromatici propongo di distinguere gli esemplari gialli col nome di var. *flava* nova.

La specie è caratteristica delle parti subtropicali del territorio egiziano (Gebel Elba, Kharga). Ne ho trovato un esemplare al Fayum in Autunno.

C. lateriproducta lateriproducta nov.spec. : Tipo ♀, Fayum, 24 Ottobre 1937.

C. lateriproducta lateriproducta nov.spec. : Tipo ♂, Mansurieh, 15 Agosto 1934.

C. lateriproducta flava nov.var. : Tipo ♀, El Alag, 22 Agosto 1913.

C. lateriproducta flava nov. var. : Tipo ♂, Gebel Asfar, 26 Maggio 1935.

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Le specie seguenti si rassomigliano per il disegno e per i colori e la loro diagnosi ha dato luogo a numerose discussioni. Il Morice è riuscito a dimostrare che due di queste specie si debbono identificare con *Fischeri* Spin. e con *tricolorata* Spin. (che egli ritiene sinonimo di *insignis* Klug). Sono perfettamente d'accordo su questa identificazione; solo mi sembra che non vi siano dati sufficienti per dimostrare che *insignis* Klug e *tricolorata* Spin. siano lo stesso insetto e preferisco quindi conservare quest'ultimo nome. Lo Schletterer aveva considerata la descrizione di *Fischeri* Spin. insufficiente. Ritengo che, sotto il nome di *subimpressa* Schlett., abbia ridescritto la specie che il Morice ha dimostrato identica a *Fischeri* Spin.; infatti sia i caratteri cromatici che quelli strutturali e sculturali coincidono negli esemplari che ho potuti esaminare, né mi è stato possibile, sulla base delle tre descrizioni dello Spinola, del Morice e dello Schletterer, distinguere *Fischeri* Spin. da *subimpressa* Schlett. Quest'ultimo autore descrive di Egitto, sotto il nome di *Klugi*, una specie estremamente simile a *Fischeri* Spin., nella quale la scultura del segmento mediano intorno all'area cordata è fitta come sul resto e non sparsa. Posseggo tre ♂♂ che presentano questo carattere; trattandosi però di esemplari mal conservati e non essendo a mia disposizione nessuna ♀, mi son limitato a citare *Klugi* Schlett. nella tavola dicotomica, riservandomi di dare la descrizione della specie quando possederò un materiale più abbondante.

Una delle specie di questo gruppo, caratterizzata dal peziolo molto lungo e dal colore biancastro dei disegni, mi sembra poter essere attribuita ad *alboatra* Walker. Di un'altra specie posseggo una sola ♀ in ottimo stato. Secondo le tavole dello Schletterer si dovrebbe identificarla con *spectabilis* Rad., descritta di Astrabad; però i colori non corrispondono e inoltre la specie presenta caratteri strutturali talmente peculiari che è impossibile siano sfuggiti al Radoszkovski; la ritengo quindi nuova.

Restano due specie, di ciascuna delle quali posseggo un solo ♂. Per i

disegni e per altri caratteri una è simile ad *emarginata* Panz., l'altra a *lunata* Costa; entrambe sono però sicuramente diverse dagli esemplari europei di queste due specie. Nella collezione del Ministero di Agricoltura esistono inoltre vari esemplari raggruppabili in 4 o 5 specie, provenienti dal Gebel Elba. Non mi è stato possibile studiarli date la scarsezza del materiale e la necessità di prendere in considerazione la bibliografia della fauna etiopica. Spero di poterlo fare più tardi.

15. — C. Honorei nov. spec.

♀. — Lunghezza 9,5 mm. — Clipeo, lati della faccia e carena gialli. Mandibole gialle a punta nera. Tempie gialle. Tutto il lato ventrale, testa compresa, giallo.

Margini oculari divergenti: la distanza all'altezza dell'ocello anteriore sta a quella al clipeo come 30 a 34. Ocelli a triangolo leggermente ottusangolo, i posteriori distano fra loro quanto dal margine oculare corrispondente. Mandibole lunghe, appuntite, con un dente assai forte all'unione dei due terzi prossimali col terzo distale ed uno piccolissimo un po' più verso la base. Faccia larga: la parte media del clipeo larga e bassa, concava a partire dalla metà dell'altezza, col margine libero rettilineo limitato da un piccolo rilievo ai lati; parti laterali basse. Tutto il clipeo coperto di fittissima pubescenza bianca che nasconde quasi del tutto la scultura, consistente in microrugosità di base con pochi punti superficiali. Lati della faccia pianeggianti, pure pubescenti, egualmente scolpiti. Solco d'inserzione antennare largo e superficiale; carena interantennare alta e corta. Occipite e tempie molto sviluppati, la testa quasi quadrangolare in proiezione superiore; la scultura di queste parti consistente in punti grandi e fitti ma non confluenti, su fondo lucido; le tempie a ricca pubescenza bianca. Antenne clavate, la larghezza del secondo articolo al margine distale sta a quella del penultimo al margine prossimale come 7 sta a 10. Scapo giallo.

Collare stretto, non incavato al mezzo né rilevato sui lati, con punti sparsi su microreticolazione di fondo. Il pronoto porta una spinula all'angolo infero-laterale. Dorsulo di grandezza ordinaria, con punti grandi quanto sul vertice, molto più sparsi al mezzo che sui lati, su microreticolazione di base. Scutello e postscutello quaso impuntati, con la sola microreticolazione, il primo piano, il secondo convesso. Area cordata strettissima e lunghissima, la sua altezza di circa un terzo maggiore della base, la quale non comprende che i due terzi della larghezza del margine del postscutello, liscia, con solco mediano bene sviluppato; le parti adiacenti del segmento mediano impuntate, il resto con punti sparsi superficiali su microreticolazione forte.

Zampe discretamente spinose e pubescenti. Il pettine con 5 a 6 spine assai sviluppate; apparecchio di toeletta delle tibie anteriori del tipo medio. Tibie posteriori con 5 spine al margine laterale. Rapporti di lunghezza della

tibia e dei tarsi posteriori: 33-22-9-8-5-10. Pulvilli bene sviluppati. Le anche anteriori nettamente coniche. Scagliette lucide, microstriate.

Peziolo assai lungo, subrettangolare, a punti superficiali sparsi; gli altri tergiti a punti forti e fitti, quasi confluenti, su microreticolazione di base. Campo pigidiale ovoidale, assai grande, microrugoso a strie irregolari superficiali.

Mesopleure con forte microrugosità, a punti confluenti, quasi reticolati, con una forte spina all'unione dei due terzi prossimali col terzo distale del margine esterno. Sterniti a puntuazione forte su forte microreticolazione, gli ultimi ristretti al mezzo, il secondo con un rilievo triangolare. Apofisi dell'ultimo segmento ventrale visibile strette, corte, ravvicinate.

. Tipo ♀ : Gebel Asfar, 4 Giugno 1937. — ♂ ignoto.

16. — C. alboatra Walk.

♂. — Lunghezza 6-9,5 mm. — Clipeo, lati della faccia e base della carena interantennare, gialli. Mandibole rosso cupo con la punta picea. Neri il lato ventrale del torace, le anche, i trocanteri, la base dei femori anteriore e intermedio, quasi tutti i posteriori. Il secondo e quarto sternite gialli, gli altri neri.

Margini oculari paralleli; gli ocelli posteriori distano fra loro quanto dal margine oculare corrispondente. Mandibole strette, appuntite, con una lieve ondulazione un poco più prossimalmente della metà del margine mediale. Parte media del clipeo larga circa due volte le parti laterali, di poco più alta che larga (come 17 a 15), a superficie nettamente convessa, il margine libero tridentato, assai sporgente. Tutta la testa, clipeo compreso, a scultura grossa, fitta, quasi confluente, i punti con tendenza a divenir più grandi sul vertice; pruinosità argentea abbondantissima sul clipeo, peli argentei assai lunghi su tutta la faccia e sulle tempie. Antenne clavate, a scapo giallo inferiormente, annerito superiormente, il primo articolo del funicolo nero e lucente, gli altri rosso scuro, picei al disopra a partire dal 6° o 7°, l'ultimo tutto rosso, non più lungo del penultimo, leggermente troncato all'apice.

Collare un po' ristretto e non incavato al mezzo, senza rilievi alle spalle, a scultura come sul vertice. Una spinula all'angolo infero-laterale del pronoto. Dorsulo a scultura un po' più grossa del vertice, fitta, quasi reticolata; sullo scutello i punti egualmente grossi, nettamente separati, ma fitti; il postscutello con punti molto meno fitti, di due terzi minori di quelli dello scutello. Area cordata a triangolo equilatero, a fondo liscio e lucente, convessa, con sei ad otto grossi rilievi longitudinali che delimitano avvallamenti profondi e in alcuni esemplari si arrestano al mezzo, in altri raggiungono l'apice. Lati del segmento mediano a scultura fitta come sul dorsulo, con pilosità argentea sulle parti laterali.

Zampe sottili e slanciate. Apparecchio di toeletta delle tibie anteriori del

tipo cortissimo. Tibie posteriori con 5 a 7 spine al margine laterale. Rapporti di lunghezza delle tibie e tarsi posteriori: 31-21-10-7-4-6. Pulvilli piccoli. Scagliette fortemente punteggiate.

Peziolo molto allungato (in un esemplare ben disteso e in proiezione dorsale la lunghezza sta alla larghezza come 25 sta a 15), stretto (la sua larghezza al margine distale sta a quella del secondo segmento a questo margine come 15 sta a 40). Scultura dei tergiti fitta, grossa, quasi reticolata. Il secondo segmento addominale è ristretto anteriormente, campaniforme. Campo pigidiale subrettangolare, col margine distale appena un po' minore del prossimale, a superficie puntato-reticolata come i tergiti, leggermente concavo all'apice, con i tre margini ben rilevati, il distale leggermente convesso.

Lato ventrale della testa a punti relativamente fitti, molto piccoli. I lati del mesosterno, visti dal disopra, presentano al mezzo una piccola punta acuta. Prosterno, mesopleure e mesosterno reticolato-puntati. Il secondo sternite senza rilievo alla base, a superficie liscia con punti sparsi; gli sterniti dal 3° al 5° lisci al mezzo, puntati sui lati, che sono rialzati, il 6° presenta ai due lati verso il mezzo del margine distale un denticolo aguzzo semitrasparente. Pilosità dell'addome bianca, giacente, più ricca al margine degli ultimi sterniti.

♀ (inedita). — Lunghezza 12 mm. — Per il colore è simile al ♂, solo il tòno fondamentale dell'addome è rosso cupo e non nero. Di questo colore sono il 4° e il 6° segmento addominale, il 5° è giallo. Colore delle mandibole, delle zampe, delle antenne, della faccia, infumatura dell'apice alare come nel ♂. Lato ventrale della testa e del torace nero, dell'addome rosso cupo.

Forma generale e scultura della testa, margini oculari, rapporti di distanza fra ocelli ed occhi come nell'altro sesso. Mandibole forti, non dentate, appuntite, appena ondulate al mezzo del margine mediale. Parte media del clipeo larga quanto alta, due volte circa più larga delle parti laterali, leggermente convessa sui due terzi superiori, pianeggiante sul terzo inferiore; il margine libero è largo quanto la distanza che separa l'origine delle suture da cui originano le parti laterali, quindi le due linee tirate dai suoi estremi all'angolo formato dall'origine di queste suture sono parallele; è ondulato (a forte ingrandimento appare bottonuto). Subito al disopra del margine libero, ai due lati della linea mediana, vicinissimi, piccoli ma ben visibili, si notano due rilievi rotondi posti su una piccola infossatura. Scultura come nel ♂, pruinosità anche più fitta che in questo, ricuoprente totalmente la scultura sulle parti laterali del clipeo e della faccia. Antenne molto simili a quelle del ♂; il secondo articolo del funicolo nettamente più lungo che in *tricolorata* Spin.; l'ultimo non più lungo del precedente, conico.

Forma e scultura del torace come nel ♂; manca però la spinula al margine infero-esterno del pronoto. L'area cordata porta 9 solchi, profondi come nel ♂, ma non esattamente paralleli, limitati alla metà prossimale; l'apice è liscio. Scultura dei lati del segmento mediano come nel ♂.

Zampe con spine più abbondanti che nell'altro sesso, le tibie posteriori con 7 spine al margine laterale (oltre le terminali) accompagnate da un'altra serie incompleta posta più lateralmente; apparecchio di toeletta delle tibie anteriori del tipo cortissimo come nel ♂, tarsi anteriori con 5 spine al pettine (oltre le due terminali), assai grosse a lunghe. Scagliette subopache, pruinose, non punteggiate.

Scultura dell'addome come nel ♂. Il peziolo è assai più corto che in questo ma più lungo che nella ♀ di *tricolorata* Spin.; il secondo segmento non è campaniforme ma conformato come in quest'ultima specie. Campo pigidiale ad ovoide appuntito, stretto e lungo, leggermente concavo all'estremo distale, coi bordi ben rilevati, a rughe grosse tendenti a disporsi radialmente ai margini nei due terzi prossimali, finemente rugoso sul terzo distale.

Lato ventrale della testa e del torace come nel ♂, mesopleure senza spina al margine laterale, secondo sternite senza rilievo alla base, a puntuazione sparsa su fondo microreticolato come i seguenti. Il penultimo porta al mezzo un'infossatura simile a quella della ♀ di *tricolorata* Spin., col margine distale inciso angolarmente al mezzo; l'ultimo sternite visibile è cortissimo, con le apofisi lunghe, grosse, molto ravvicinate, parallele.

Per molto tempo ho confuso questa ♀ con quelle di *tricolorata* Spin. L'aspetto generale ed una serie di caratteri di grande importanza giustificano questa confusione. Nel rivedere i miei esemplari, però, sono stato colpito dalla leggera infumatura dell'apice alare, e dalla lunghezza relativa del peziolo. L'esame del clipeo, dell'area cordata, del campo pigidiale, del secondo sternite che è privo di rilievo basale, delle apofisi dell'ultimo sternite visibile, etc., etc., mi ha tolto ogni dubbio circa la necessità di separare questo esemplare dagli altri. Lo ho attribuito ad *alboatra* Walk. per le analogie del colore, della scultura e della pruinosità, per la forma dell'occipite e delle tempie, per il tipo delle antenne, per l'aspetto caratteristico dell'area cordata, per la ricchezza in spine delle zampe, per la forma dell'apparecchio di toelette delle tibie anteriori, anche più corto che in *rutila* Spin., *Komarovi* Rad, e *lateriproducta* nov. spec.. Ciò non ostante, riconosco che l'identificazione è dubbia. Se si confermerà in avvenire, *alboatra* Walk. verrà a porsi nel gruppo di *bupresticida* Duf., *odontophora* Schlett. e *tricolorata* Spin., pur non potendo esser confusa con nessuna di queste. Altrimenti, occorrerà trovare per questa ♀ un nome nuovo e cercare ancore l'altro sesso di *alboatra* Walk.

Non c'è però, in ogni caso, da aspettarsi che quest'altro sesso sia molto simile a quello conosciuto, poiché altrimenti sarebbe già stato descritto. Il fatto che per tanti anni i soli ♂♂ siano stati raccolti rende assai probabile l'esistenza di un dimorfismo sessuale spiccato.

Tipo : Gebel Asfar, 4 Giugno 1937.

È specie assai comune nel sesso ♂ in primavera e in estate sui margini del deserto; non mi è invece nota che la sola ♀ ora descritta.

17. — C. tricolorata Spin.

♀. — Lunghezza 9-12 mm. — Alla faccia sono gialli il clipeo, i lati e parte della carena interantennare. Scapo giallo. Mandibole rossastre a punta scura. Lato ventrale della testa e del torace rossastro a nero; scuri le anche, i trocanteri, la base dei femori delle due prime paia, quasi tutti quelli del terzo. Sterniti addominali scuri.

Margini oculari paralleli. Ocelli a triangolo molto appiattito, i posteriori distanti fra loro quanto ciascuno dal margine oculare corrispondente. Mandibole lunghe e appuntite, con due leggeri rilievi verso il mezzo del margine mediale. Parte media del clipeo due volte più larga delle parti laterali, non molto alta, convessa, col margine libero molto largo, leggermente concavo, portante su ogni lato due denti, uno grande all'estremità, un altro minore un po' più medialmente. Subito al disopra del margine libero la parte convessa si rialza in due denticoli quasi a contatto fra loro, sui due lati della linea mediana. Lati della faccia leggermente convessi, solco d'inserzione antennare poco marcato. Clipeo e lati della faccia riccamente pubescenti, con forte microreticolazione di base e punti superficiali non molto fitti. Carena interantennare corta, piuttosto arrotondata. Occipite e tempie pochissimo sviluppati, le tempie specialmente molto sottili; queste parti a punti assai profondi, fitti, quasi confluenti. Antenne leggermente clavate: la larghezza del secondo articolo del funicolo al suo margine distale sta a quella del penultimo al margine prossimale come 8 sta a 10.

Collare molto stretto, appena infossato al mezzo, arrotondato alle spalle, con punti sparsi. Una piccola spina al margine infero-laterale del pronoto. Dorsulo largo, lucente, a punti profondi, assai grandi, separati al mezzo da spazi non di molto maggiori del loro diametro, appena un po' più fitti sui lati. Scutello pianeggiante, con punti un po' minori, separati da spazi da due a quattro volte maggiori del loro diametro, su fondo lucente. Postscutello leggermente convesso, a punti piccolissimi, superficiali. Area cordata larga e corta, lucentissima, senza solco mediano, con una serie di impressioni immediatamente sotto il margine prossimale. Parti laterali del segmento mediano a punti fitti, quasi confluenti, non meno fitti vicino all'area cordata che sul resto, su fondo lucente senza microscultura.

Zampe assai spinose e pubescenti. Pettine con 5 o 6 spine lunghe, piuttosto sottili. Tibie posteriori con 7 spine forti al margine laterale, su rilievi alti e stretti; i lati fortemente pubescenti. Rapporti di lunghezza fra le tibie e i tarsi posteriori: 40-25-10-9-6-10. Unghie forti, pulvilli piccoli. Anche anteriori di forma ordinaria. Scagliette assai sviluppate, lisce, lucenti, con qualche punto piccolissimo.

Peziolo quasi globoso, poco più largo che lungo; gli altri segmenti addominali molto larghi: la larghezza del peziolo al suo margine distale sta a quella del secondo tergite a questo margine come 20 a 52. Il secondo tergite

e i seguenti a punti molto fitti, quasi a contatto; il peziolo a punti un po' più radi; il fondo lucente, appena microreticolato sui tergiti dal secondo in poi. Campo pigidiale ovoidale, fortemente rugoso.

Prosterno con un leggero rilievo spiniforme al mezzo. Mesopleure punteggiate come i tergiti, senza spine laterali. Il secondo sternite con un piccolo rilievo triangolare non molto rialzato. Tutti gli sterniti pubescenti, a puntuazione meno fitta dei tergiti, il penultimo con un forte incavo al mezzo, limitato distalmente da un rilievo ondulato. Le apofisi dell'ultimo segmento visibile corte, lo spazio che le separa stretto alla base, più largo all'apice.

♂. — Molto simile alla ♀ per colore, scultura e aspetto generale. Clipeo assai alto, convesso, con margine libero nero, lucido, rettilineo, molto pubescente, scolpito come nella ♀. Il rilievo alla base del secondo sternite molto piccolo. Sul penultimo sternite manca l'incavo mediano; esiste invece da ogni lato una spinula sul margine postero-esterno. Campo pigidiale rettangolare, stretto, punteggiato quasi come i tergiti. Antenne, collare, dorsulo, area cordata, anche anteriori, etc., come nella ♀.

La specie non è rara sui margini del deserto sopratutto in primavera.

18. — C. Fischeri Spin.

♀. — Lunghezza 8 mm. — Clipeo, lati della faccia, carena interantennare e scapo gialli. Antenne rossastre sul lato ventrale, oscurate dorsalmente. Lato ventrale della testa e torace neri; anche, trocanteri e femori giallo-rossastri. Il terzo sternite giallo, gli altri scuri.

Margini oculari paralleli, ocelli a triangolo assai appiattito, i posteriori distanti fra loro quanto dal margine oculare corrispondente. Mandibole con due piccolissimi rilievi al mezzo del margine interno. Parte media del clipeo due volte più larga delle parti laterali, convessa sulla metà superiore, concava sulla inferiore, col margine libero large, continuantesi ad angolo con quello delle parti laterali che è concavo. Lati della faccia pianeggianti, solco d'inserzione antennare quasi inesistente. Carena cortissima, arrotondata all'estremo superiore. Occipite e tempie poco sviluppati come in *tricolorata* Spin.. Scultura delle varie parti della testa distribuita come in questa specie, solo più fitta. Antenne clavate.

La scultura delle parti dorsali del torace è simile a quella di *tricolorata* Spin.. Manca il denticolo all'angolo latero-inferiore del pronoto. L'area cordata è divisa da un solco longitudinale mediano sottile e superficiale, è liscia e lucente, non porta impressioni al margine prossimale ed è circondata da parti del segmento mediano lucentissime, quasi senza punti. Nel resto il segmento mediano porta punti staccati non molto fitti, della grandezza di quelli del dorsulo.

Le zampe sono molto meno spinose che in *tricolorata* Spin.. Il pettine ha 4 sole spine sottili e gracili, oltre le 2 terminali. Le tibie posteriori portano

4 a 5 spine su rilievi piccoli. Rapporti di lunghezza della tibia e dei tarsi posteriori: 32-21-10-8-5-9. Unghie sottili, pulvilli piccoli. Le anche anteriori sono nettamente coniche. Scagliette come in *tricolorata* Spin..

Scultura e forma delle parti ventrali del torace come in *tricolorata* Spin.. Il rilievo del secondo sternite addominale è a margine arrotondato invece che triangolare. Il penultimo sternite porta ai margini un rilievo accentuato ma non spiniforme.

Forma e scultura dei tergiti come in *tricolorata* Spin.; anche il campo pigidiale simile, solo meno fortemente scolpito, con peli bianchi sulla metà prossimale della sua superficie. Le apofisi dell'ultimo sternite visibile più fini e meno divergenti che in *tricolorata* Spin..

♂. — Lunghezza 7-9 mm. — Somiglia moltissimo alla ♀ e quindi anche al ♂ di *tricolorata* Spin., da cui si distingue principalmente per le anche anteriori coniche, l'area cordata divisa longitudinalmente, le parti del segmento mediano contigue lucenti e quasi impuntate, il rilievo sul secondo sternite a margine arrotondato, le spine del penultimo sternite forti e ottuse. Il terzo sternite sembra essere constantemente giallo. Inutile cercare caratteri differenziali sul clipeo e sul campo pigidiale, che rassomigliano a quelli di *tricolorata* Spin..

La specie non è rara sui margini del deserto, dove si presenta sopratutto in estate e in autunno, sostituendo, in certo modo, *tricolorata* Spin. che è prevalentemente primaverile.

APPENDICE

Armatura genitale dei ♂♂

La scarsità del materiale mi ha impedito di ottenere l'apparato genitale di tutti i ♂♂ studiati; perciò non ne ho parlato a proposito di ciascuna specie. Le 7 armature di cui riporto la riproduzione schematica mi sembrano però abbastanza interessanti. Soltanto quelle di *Alfierii* nov. spec. e di *Fischeri* Spin. sono molto simili, quasi eguali; le altre differiscono tutte notevolmente fra loro. Si noti la lunghezza eccezionale delle volselle in *lutea* Taschb., la ricchezza in peli arricciolati all'apice sul lato esterno delle valve in *Komarovi* Rad.. L'armatura di *pharaonum* Kohl è notevolmente corta e larga. L'esame dei genitali ha confermato l'identità specifica di *Alfierii Alfierii* nov. spec. ed *Alfierii picta* nov. var.

CONCLUSIONE

Nessuna delle specie che ho potuto identificare si presenta sulle coste europee del Mediterraneo. Per questo carattere la fauna egiziana differisce da quella dell'Algeria e del Marocco, ricca di specie propriamente europee. Due delle specie descritte (*capito* Lep. e *Komarovi* Rad.) sono proprie dell'Asia centrale ; le altre, quasi senza eccezione, si ritrovano anche nel resto dell'Africa mediterranea. *Erythrocephala* Dahlb. è specie più propriamente etiopica, diffusa nell'Africa orientale (il ♂, sotto il nome di *selifera* Schlett., è stato descritto dallo Schletterer di questa regione). Di tipo piuttosto etiopico mi sembrano *sulcipyga* nov. spec., *rutila* Spin., *Döderleini* Schulz, *lateriproducta* nov. spec.. *Döderleini* Schulz è stata descritta nel sesso ♂ dell'Algeria ; la sua scultura però ricorda molto quella di alcune specie etiopiche.

Nessuna delle specie descritte si trova nei due lavori del Brauns e dell'Arnold ; il fatto non deve però meravigliare. Il Brauns si è occupato sopratutto della fauna del Sud Africa e l'Arnold ha esplicitamente dichiarato di non voler occuparsi delle specie della valle del Nilo, ritenendole appartenenti in prevalenza all'Africa paleartica.

Quando la conoscenza della fauna dell'Abissinia e del Sudan sarà più avanzata, è probabile si trovi che molte specie desertiche egiziane discendono molto più verso il Sud di quanto non si pensi d'ordinario, data l'omogeneità del clima e della flora nella più gran parte dell'Africa orientale secca.

NOTA

Nell'opera « *Exploration Scientifique de l'Algérie*, Zool., III, Insectes, 1849, p. 255 e Tavola XIII, fig. 3 » è figurata e descritta sotto il nome di *Cerceris rufiventris* Lep. de Saint-Fargeau una ♀ che corrisponde per i colori alla mia *Cerceris sulcipyga* nov. spec.. A proposito del pigidio è detto : « *quant aux carènes du pygidium, elles sont droites et parallèles* ». È impossibile stabilire l'identità di *sulcipyga* nov. spec. con *rufiventris* Lep. perchè nella descrizione di quest'ultima gli altri caratteri anatomici sono troppo sommariamente riportati.

TAVOLE I-XV

Spiegazione della Tavola I

Fig. 1, ♀. — *Cerceris erythrocephala* Dahlb.

Fig. 1, ♂. — *Cerceris erythrocephala* Dahlb.

Fig. 2, ♀. — *Cerceris capito* Lep.

Fig. 2, ♂. — *Cerceris capito* Lep.

Fig. 3, ♀. — *Cerceris sulcipyga* nov. spec.

Fig. 4, ♀. — *Cerceris rutila* Spin.

Fig. 5, ♂. — *Cerceris Komarovi* Rad.

Fig. 6, ♀. — *Cerceris Döderleini* Schulz (inedita).

Fig. 6, ♂. — *Cerceris Döderleini* Schulz.

Fig. 7, ♀. — *Cerceris lutea* Taschbg.

Dott. A. Mochi

Tavola I

Dott. A. Mochi Pinx

Cerceris d'Egitto

Photo-Chromo-Gravure - Lyon.

Tavola II

Spiegazione della Tavola II

Fig. 8, ♀. — *Cerceris pruinosa* Morice.

Fig. 9, ♂. — *Cerceris pharaonum* Kohl.

Fig. 10, ♂. — *Cerceris pulchella* Klug.

Fig. 13, ♂. — *Cerceris Alfierii picta* nov. var.

Fig. 14, ♀. — *Cerceris lateriproducta* nov. spec.

Fig. 14, ♂. — *Cerceris lateriproducta* nov. spec.

Fig. 15, ♀. — *Cerceris Honorei* nov. spec.

Fig. 16, ♂. — *Cerceris alboatra* Walker.

Fig. 17, ♀. — *Cerceris tricolorata* Spin.

Fig. 18, ♂. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola II

Dott. A. Mochi Pinx

Cerceris d'Egitto

Photo-Chromo-Gravure - Lyon.

Tavola III

Spiegazione della Tavola III

Aspetto generale e scultura di :

Fig. 1, ♀. — *Cerceris erythrocephala* Dahlb.

Fig. 1, ♂. — *Cerceris erythrocephala* Dahlb.

Fig. 2, ♀. — *Cerceris capito* Lep.

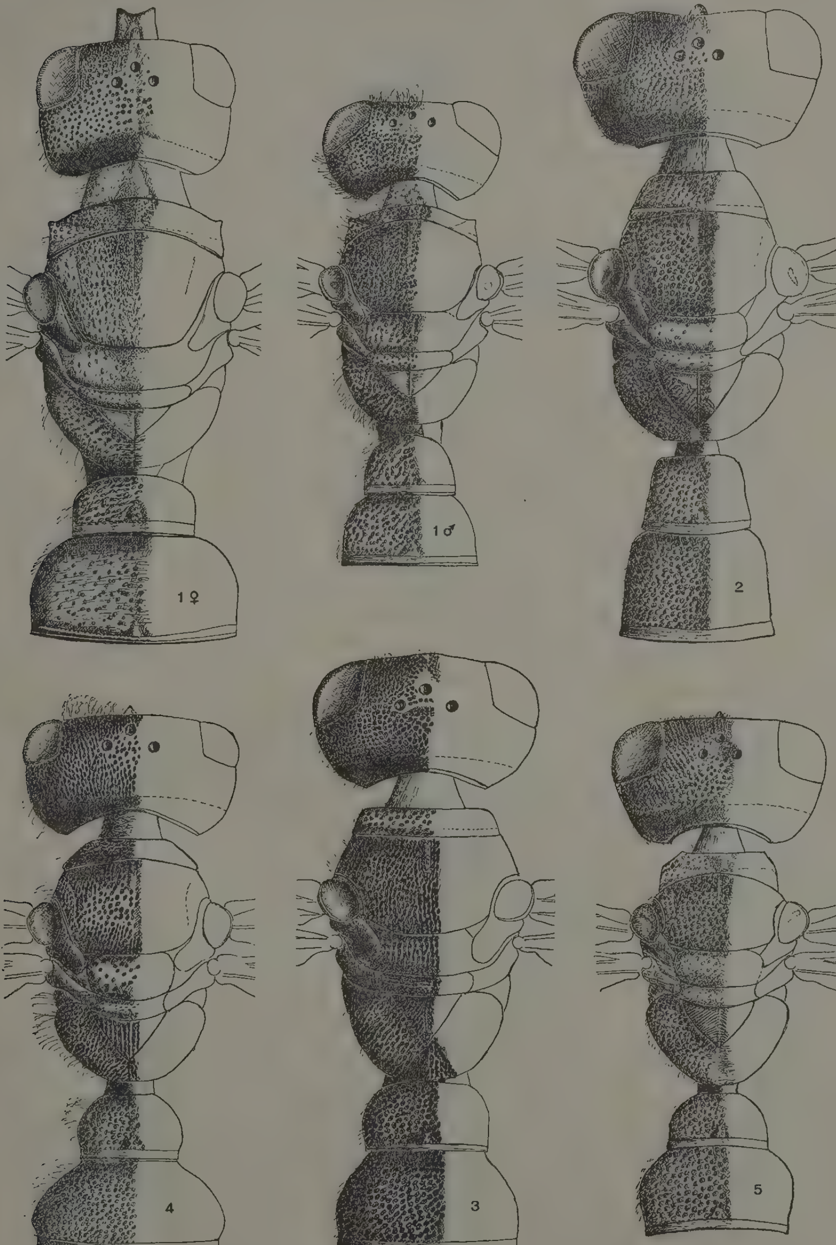
Fig. 3, ♀. — *Cerceris sulcipyga* nov. spec.

Fig. 4, ♀. — *Cerceris rutila* Spin.

Fig. 5, ♀. — *Cerceris Komarovi* Rad.

Dott. A. Mochi

Tavola III



Cerceris d'Egitto

Spiegazione della Tavola IV

Aspetto generale e scultura di :

Fig. 6, ♀. — *Cerceris Döderleini* Schulz (inedita).

Fig. 7, ♀. — *Cerceris lutea* Taschbg.

Fig. 8, ♀. — *Cerceris pruinosa* Morice.

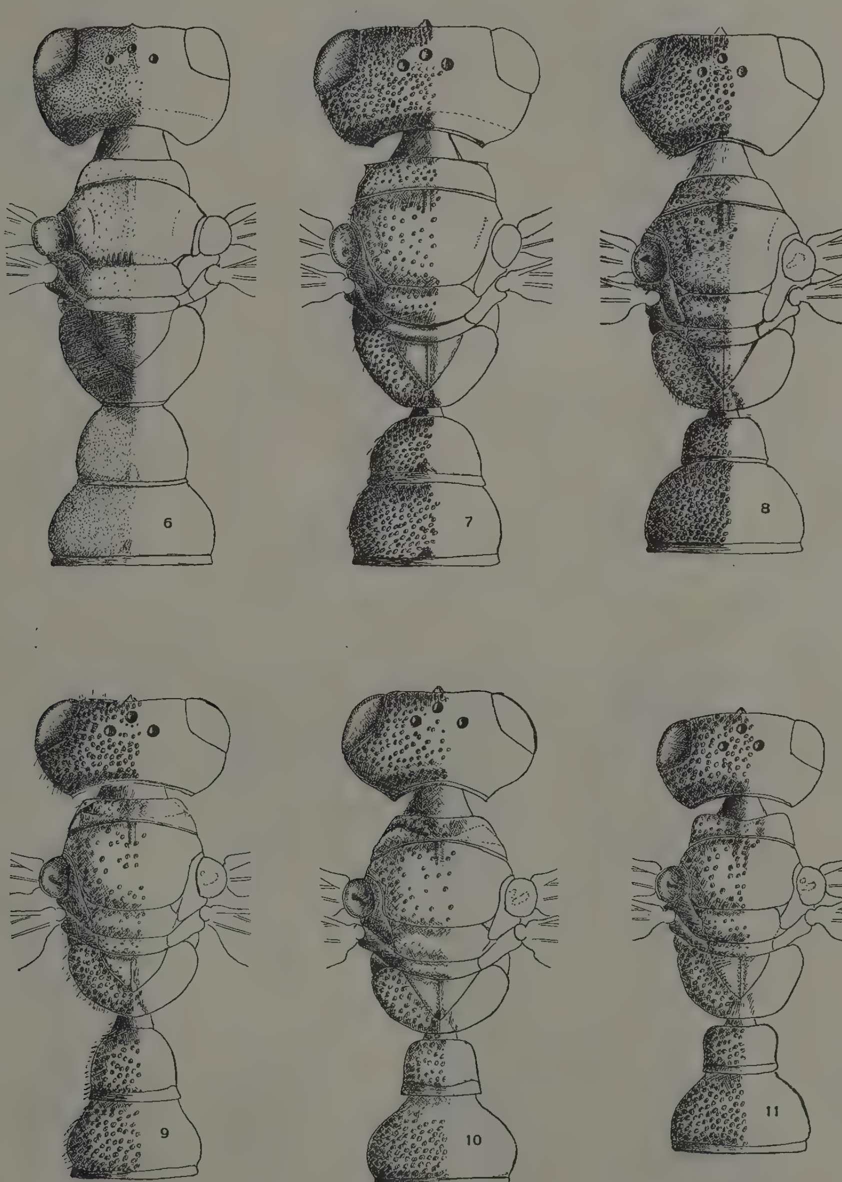
Fig. 9, ♂. — *Cerceris pharaonum* Kohl.

Fig. 10, ♂. — *Cerceris pulchella* Klug.

Fig. 11, ♂. — *Cerceris pallidula* Morice.

Dott. A. Mochi

Tavola IV



Cerceris d'Egitto

Spiegazione della Tavola V

Aspetto generale e scultura di :

Fig. 12, ♀. — *Cerceris Priesneri* nov. spec.

Fig. 13, ♂. — *Cerceris Alfierii* nov. spec.

Fig. 14, ♀. — *Cerceris lateriproducta* nov. spec.

Fig. 15, ♀. — *Cerceris Honorei* nov. spec.

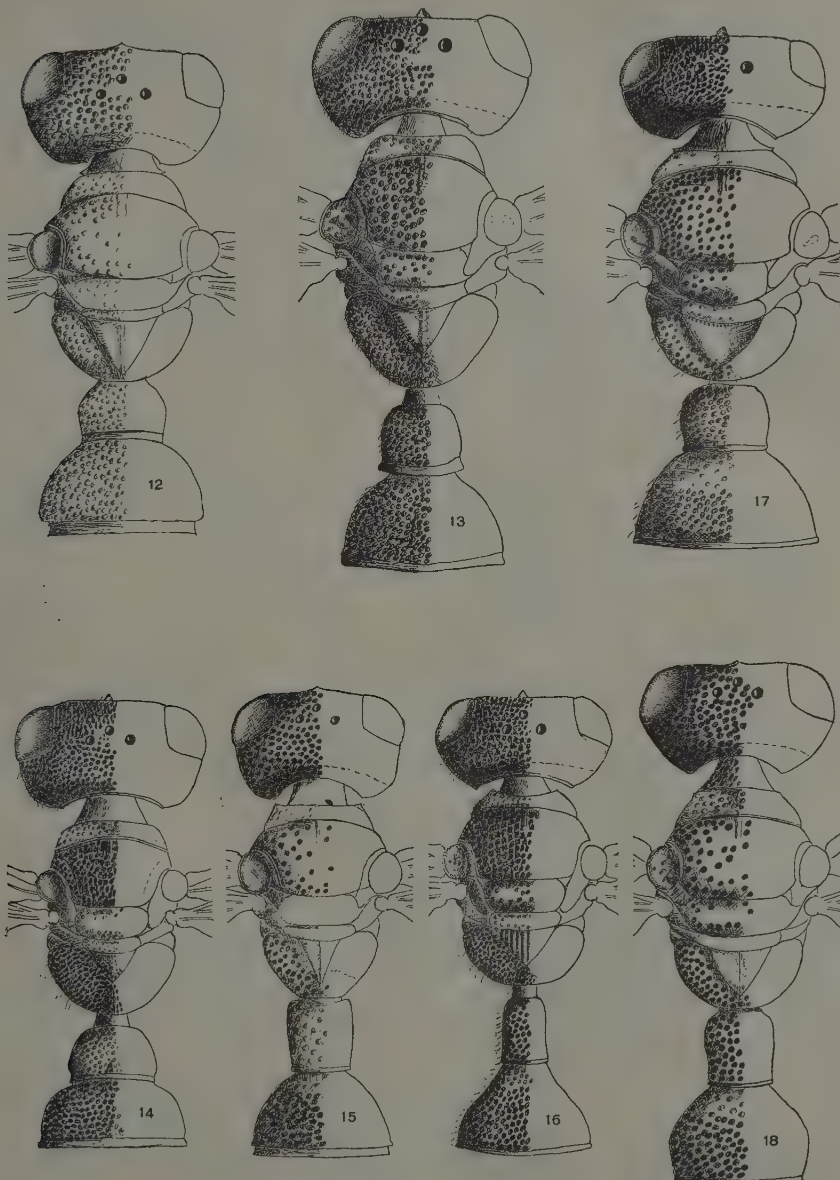
Fig. 16, ♂. — *Cerceris alboatra* Walker.

Fig. 17, ♀. — *Cerceris tricolorata* Spin.

Fig. 18, ♂. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola V



Cerceris d'Egitto

Spiegazione della Tavola VI

Clipeo e mandibole delle ♀ ♀ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin.

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz (inedita).

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

Fig. 15. — *Cerceris Honorei* nov. spec.

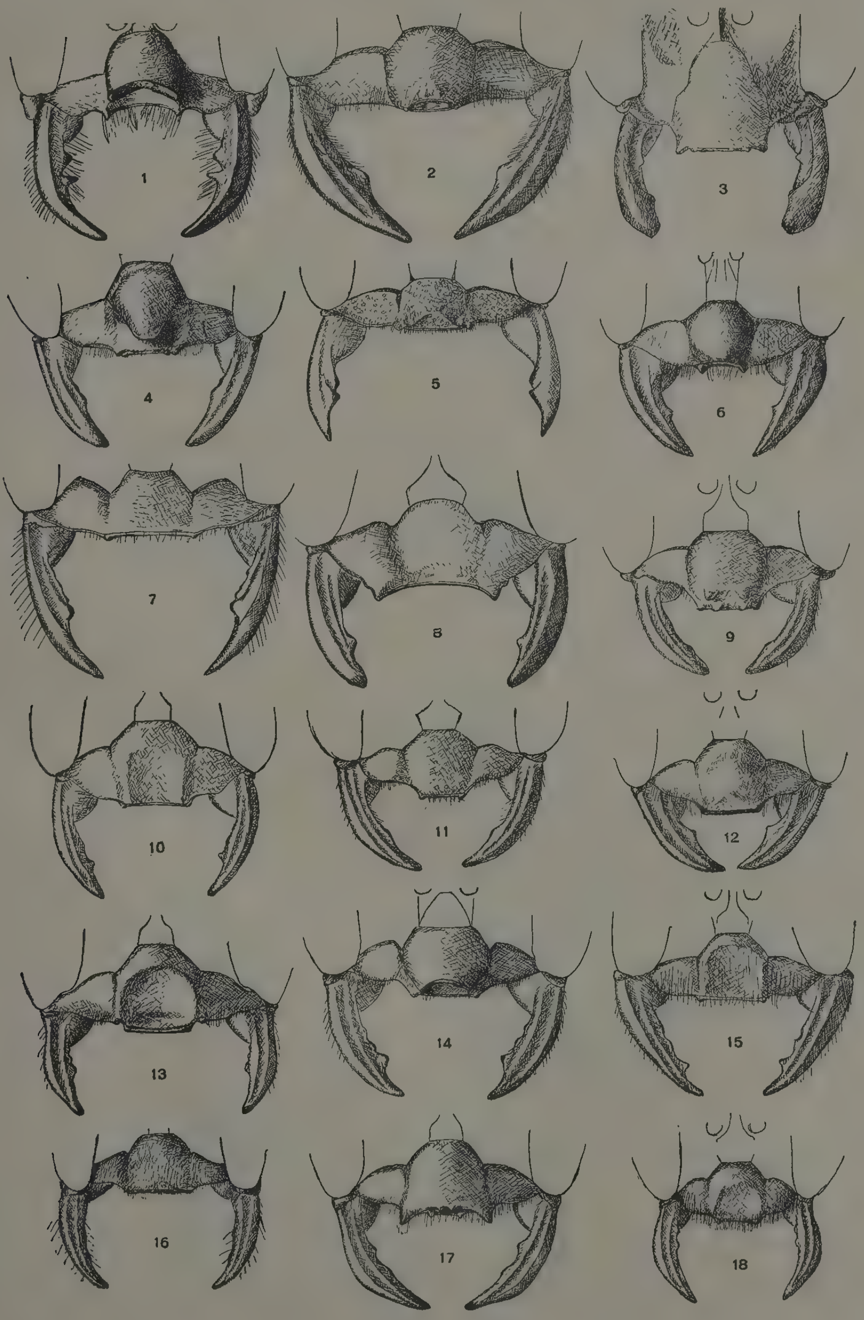
Fig. 16. — *Cerceris alboatra* Walker (inedita).

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola VI



Cerceris d'Egitto

Spiegazione della Tavola VII

Clipeo dei ♂♂ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin. (inedita).

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz.

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

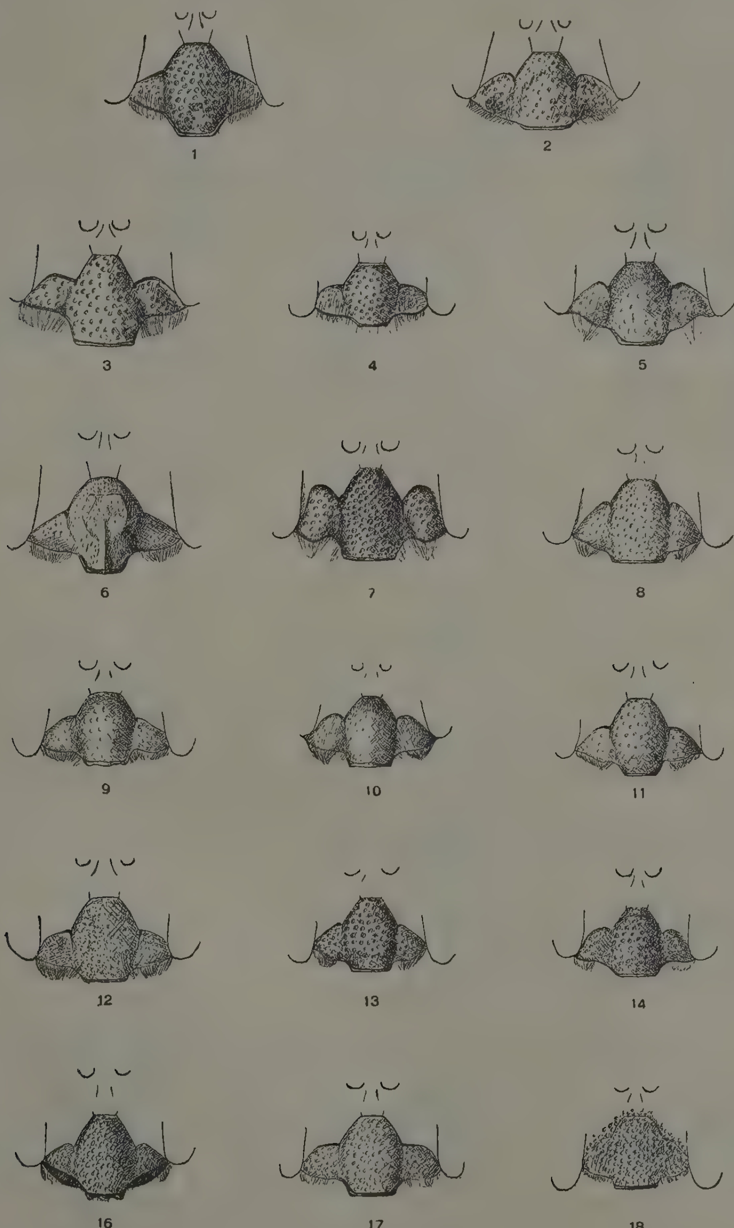
Fig. 16. — *Cerceris alboatra* Walker.

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola VII



Cerceris d'Egitto

Spiegazione della Tavola VIII

Zampe delle ♀♀ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin.

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz (inedita).

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Dott. A. Mochi — Tavola VIII

Cerceris d'Egitto

Spiegazione della Tavola IX

Zampe delle ♀♀ di :

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris laterıproducta* nov. spec.

Fig. 15. — *Cerceris Honorei* nov. spec.

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Apparecchio di toeletta delle tibie anteriori delle ♀♀ di :

Fig. 19. — *Cerceris rutila* Spin. (tipo breve).

Fig. 20. — *Cerceris capito* Lep. (tipo medio).

Fig. 21. — *Cerceris sulcipyga* nov. spec. (tipo lunghissimo).

Fig. 22. — *Cerceris alboatra* Walker (inedita) (tipo brevissimo).

Estremità della tibia intermedia delle ♀♀ di :

Fig. 23. — *Cerceris sulcipyga* nov. spec.

Fig. 24. — *Cerceris lutea* Taschbg.

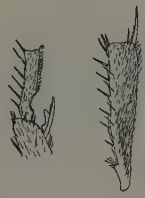
Metatarso intermedio del ♂ di :

Fig. 25. — *Cerceris capito* Lep.

Dott. A. Mochi

Tavola IX

12



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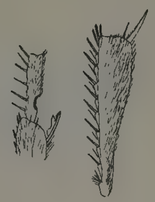

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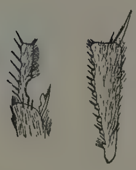

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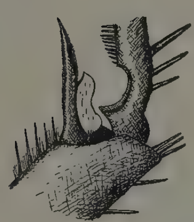

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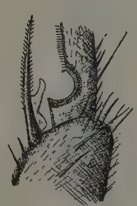

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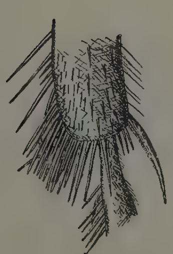

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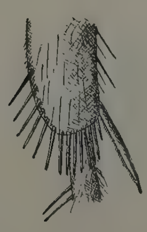

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25

Cerceris d'Egitto

Spiegazione della Tavola X

Area cordata del segmento mediano di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin.

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz.

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

Fig. 15. — *Cerceris Honorei* nov. spec.

Fig. 16. — *Cerceris alboatra* Walker.

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola X

Cerceris d'Egitto

Spiegazione della Tavola XI

Campo pigidiale delle ♀♀ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin.

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz (inedita).

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

Fig. 15. — *Cerceris Honorei* nov. spec.

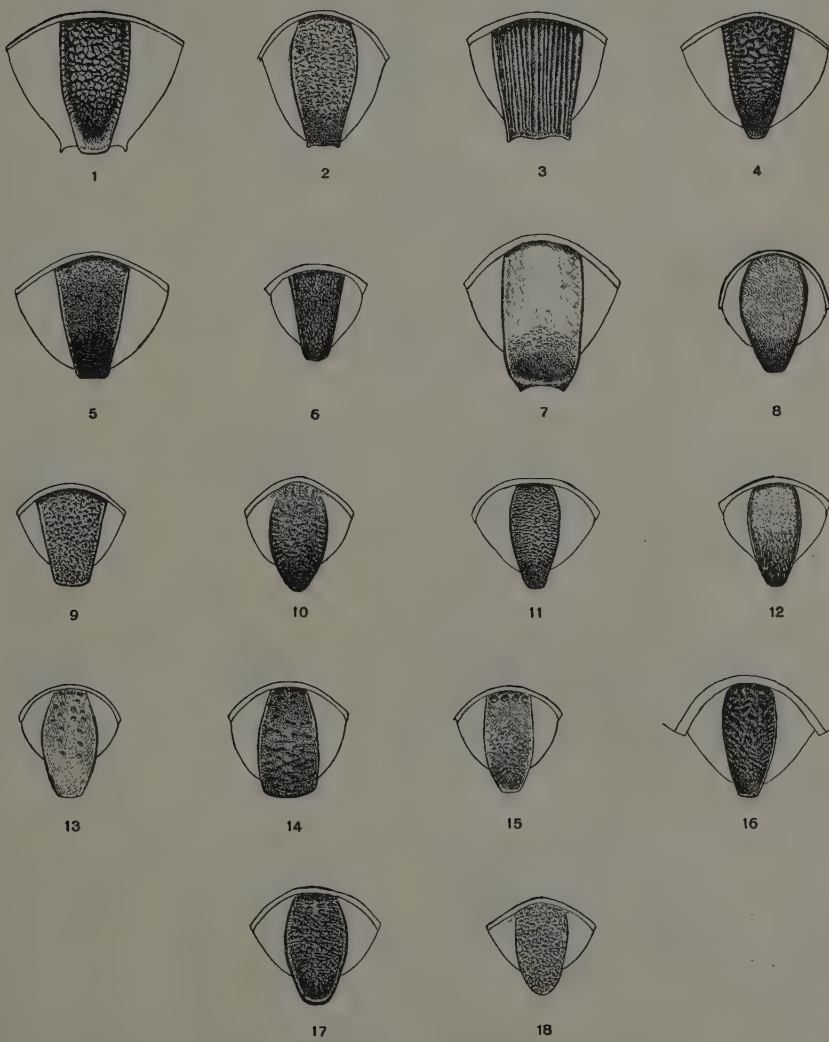
Fig. 16. — *Cerceris alboatra* Walker (inedita).

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A Mochi

Tavola XI



Cerceris d'Egitto

Spiegazione della Tavola XII

Campo pigidiale dei ♂♂ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin. (inedita).

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz.

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 12. — *Cerceris Priesneri* nov. spec.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

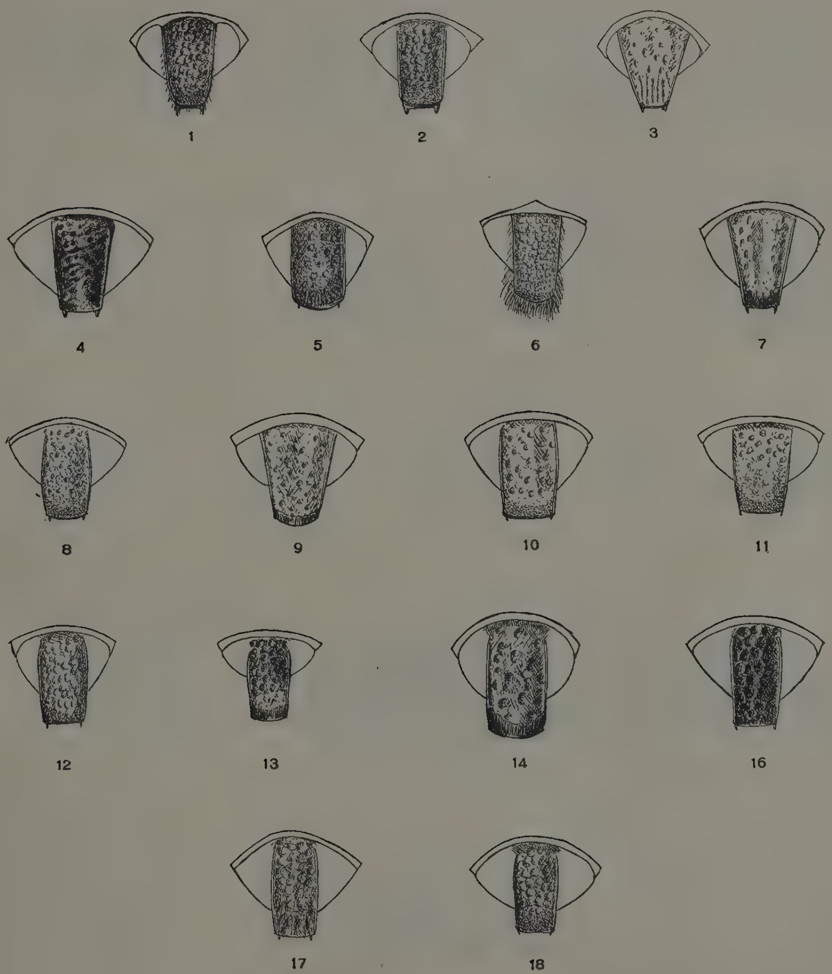
Fig. 16. — *Cerceris alboatra* Walker.

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola XII



Cerceris d'Egitto

Spiegazione della Tavola XIII

Apofisi dell'ultimo sternite visibile delle ♀♀ di :

Fig. 1. — *Cerceris erythrocephala* Dahlb.

Fig. 2. — *Cerceris capito* Lep.

Fig. 3. — *Cerceris sulcipyga* nov. spec.

Fig. 4. — *Cerceris rutila* Spin.

Fig. 5. — *Cerceris Komarovi* Rad.

Fig. 6. — *Cerceris Döderleini* Schulz (inedita).

Fig. 7. — *Cerceris lutea* Taschbg.

Fig. 8. — *Cerceris pruinosa* Morice.

Fig. 9. — *Cerceris pharaonum* Kohl.

Fig. 10. — *Cerceris pulchella* Klug.

Fig. 11. — *Cerceris pallidula* Morice.

Fig. 13. — *Cerceris Alfierii* nov. spec.

Fig. 14. — *Cerceris lateriproducta* nov. spec.

Fig. 15. — *Cerceris Honorei* nov. spec.

Fig. 16. — *Cerceris alboatra* Walker (inedita).

Fig. 17. — *Cerceris tricolorata* Spin.

Fig. 18. — *Cerceris Fischeri* Spin.

Dott. A. Mochi

Tavola XIII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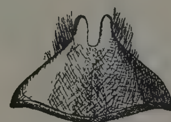
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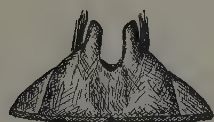
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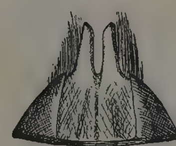
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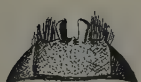
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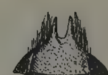
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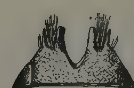
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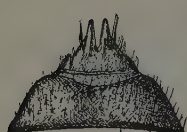
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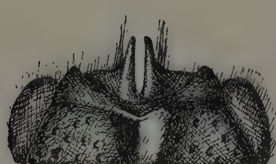
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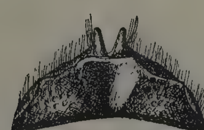
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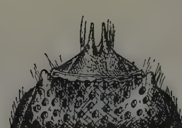

18

Cerceris d'Egitto

Spiegazione della Tavola XIV

Antenne di :

Fig. 1, ♂. — *Cerceris erythrocephala* Dahlb.
Fig. 2, ♀. — *Cerceris capito* Lep.
Fig. 2, ♂. — *Cerceris capito* Lep.
Fig. 3, ♂. — *Cerceris sulcipyga* nov. spec.
Fig. 4, ♂. — *Cerceris rutila* Spin. (inedita).
Fig. 5, ♂. — *Cerceris Komarovi* Rad.
Fig. 6, ♂. — *Cerceris Döderleini* Schulz.
Fig. 7, ♂. — *Cerceris lutea* Taschbg.
Fig. 8, ♂. — *Cerceris pulchella* Klug.
Fig. 9, ♂. — *Cerceris Priesneri* nov. spec.
Fig. 10, ♀. — *Cerceris alboatra* Walker (inedita).
Fig. 11, ♀. — *Cerceris tricolorata* Spin.

Anca anteriore di :

Fig. 12. — *Cerceris erythrocephala* Dahlb.
Fig. 13. — *Cerceris rutila* Spin.
Fig. 14. — *Cerceris Alfierii* nov. spec.
Fig. 15. — *Cerceris Fischeri* Spin.

Scaglietta di :

Fig. 16. — *Cerceris Alfierii* nov. spec.

Testa visto di profilo di :

Fig. 17, ♀. — *Cerceris erythrocephala* Dahlb.
Fig. 18, ♀. — *Cerceris capito* Lep.
Fig. 19, ♀. — *Cerceris Komarovi* Rad.
Fig. 20, ♀. — *Cerceris rutila* Spin.
Fig. 21, ♀. — *Cerceris Döderleini* Schulz (inedita).
Fig. 22, ♂. — *Cerceris Döderleini* Schulz.

Addome visto ventralmente di :

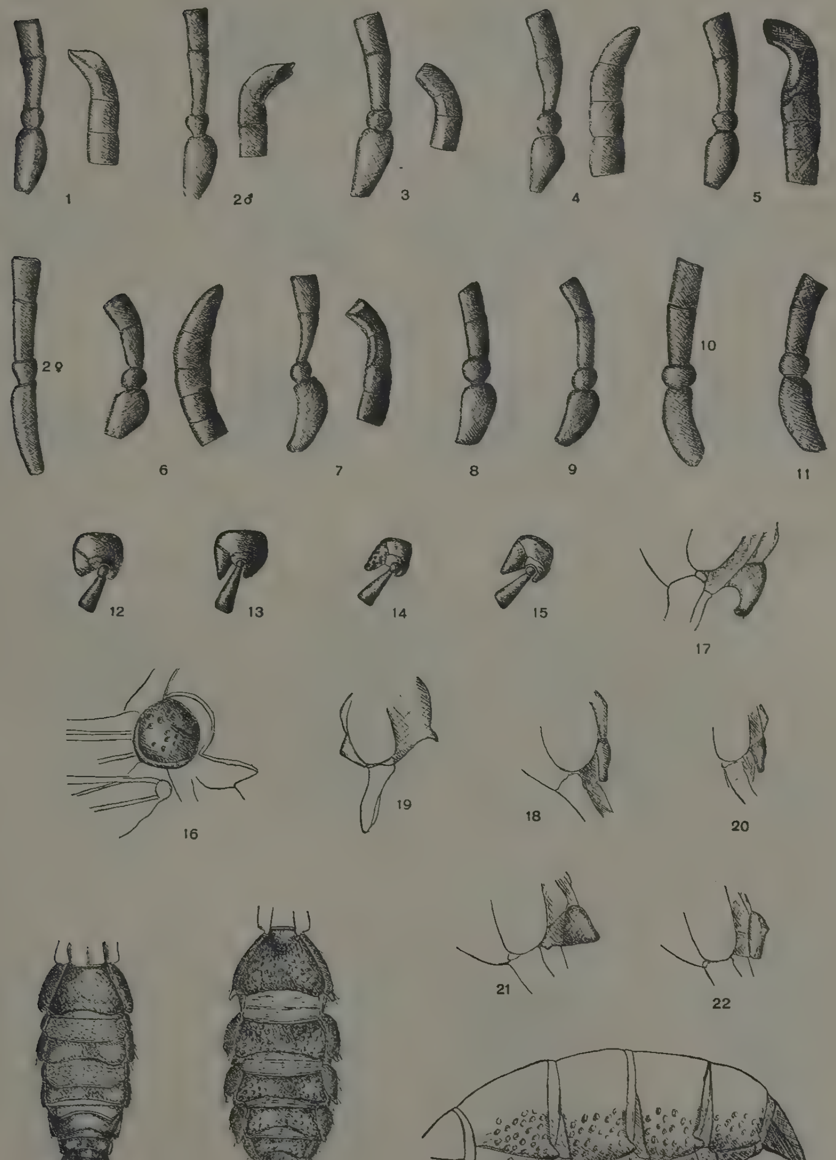
Fig. 23, ♂. — *Cerceris Alfierii* nov. spec.
Fig. 24, ♂. — *Cerceris Komarovi* Rad.

Addome visto di lato di :

Fig. 25, ♀. — *Cerceris lateriproducta* nov. spec.

Dott. A. Mochi

Tavola XIV



Cerceris d'Egitto

Spiegazione della Tavola XV

Rilievo del secondo sternite di :

Fig. 26. — *Cerceris pruinosa* Morice.

Fig. 27. — *Cerceris pulchella* Klug.

Fig. 28, ♀. — *Cerceris pallidula* Morice.

Fig. 29, ♂. — *Cerceris pallidula* Morice.

Fig. 30. — *Cerceris Priesneri* nov. spec.

Fig. 31. — *Cerceris Alfierii* nov. spec.

Fig. 32. — *Cerceris alboatra* Walker.

Fig. 33. — *Cerceris Honorei* nov. spec.

Fig. 34. — *Cerceris tricolorata* Spin.

Fig. 35. — *Cerceris Fischeri* Spin.

Armatura genitale dei ♂♂ di :

Fig. 36. — *Cerceris erythrocephala* Dahlb.

Fig. 37. — *Cerceris capito* Lep.

Fig. 38. — *Cerceris Komarovi* Rad.

Fig. 39. — *Cerceris lutea* Taschbg.

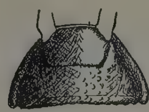
Fig. 40. — *Cerceris pharaonum* Kohl.

Fig. 41. — *Cerceris Alfierii* nov. spec.

Fig. 42. — *Cerceris Fischeri* Spin.

Dott. A Mochi

Tavola XV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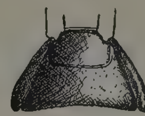
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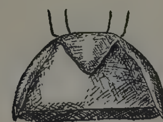
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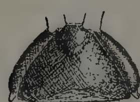
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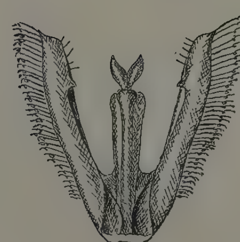
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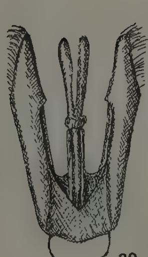
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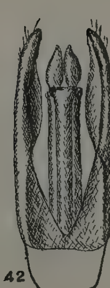
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Cerceris d'Egitto

Séance du 19 Octobre 1938

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey, *Vice-Président.*

Changement du nom de la Société:

En vertu du Décret Royal paru dans le Journal Officiel du Gouvernement Egyptien, No. 94, du 11 Août 1938, et publié aux pages V-VI du présent Bulletin, la SOCIÉTÉ ROYALE ENTOMOLOGIQUE D'EGYPTE est devenue la SOCIÉTÉ FOUAD Ier D'ENTOMOLOGIE.

Dons à la Bibliothèque:

La Société a reçu les ouvrages mentionnés ci-dessous :

1° De l'ADMINISTRATION DES BIENS PRIVÉS ROYAUX : Un exemplaire de « L'Histoire des Campagnes de Mohamed Aly et d'Ibrahim », par le Vice-Amiral DURAND VIEL, en deux volumes.

2° De Monsieur le Docteur SAADALLAH MOHAMED MADWAR, du Caire : un separata de son travail « Biology and Morphology of the Immature Stages of Mycetophilidae (Diptera, Nematocera) », extrait des Philosophical Transactions of the Royal Society of London, Vol. 227, 1937, pp. 1-100.

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5° De Monsieur J. D. Alfken, de Brême (Allemagne) : un separata de ses récents travaux sur les Hyménoptères (a) Ein weiterer Beitrag zur Kenntnis der Bienenfauna von Palästina mit Einschluss des Sinai-Gebirges (Hym.-Apid.), extrait du Deutsche Entomologische Zeitschrift, 1938, fasc. 2, 15.VII. 1938, pp. 418-433 ; (b) Contributi alla conoscenza della fauna entomologica della Sardegna (Apidae), extrait des Memorie della Società Entomologica Italiana, Vol. XVI, 4.V.1938 (XVI), p. 97-114 ; (c) Beitrag zur kenntnis der Bienenfauna von Mittel-Italien, II (extrait du Bolletino dell'Istituto di Entomologia della Reale Università di Bologna, Vol. X, 15.1.1938 (XVI), pp. 31-34) ; (d) About two new Apidae from China (extrait de Entomology and Phytopathology, Vol. V, No. 20, 1937, pp. 404-406, China).

6° De Monsieur W. Rœpke, de Wageningen (Hollande) : un separata de ses travaux (a) Ueber Indomalayische Lepidoptera Heterocera des Kön. Museums für Naturkunde in Brüssel (publié dans Bulletin du Musée Royal d'Histoire Naturelle de Belgique, Tome XIV, No. 13, 1938, pp. 1-72) ; (b) Ueber Indomalayische Nachtfalter (Lep. Heteroc.), V. (extrait de l'Entomologische Zeitschrift, LII, No. 20, 1938, Frankfurt a.M., 1938).

7° De Monsieur W. Wittmer, de Zurich (Suisse) : un separata intitulé « 10. Beitrag zur kenntnis der palaearktischen Malacodermata » (extrait du Bolletino della Società Entomologica Italiana, Vol. LXX, No. 5, 15.VI.1938 (XVI), pp. 86-87).

8° De Monsieur le Docteur N.S. Royston Malœuf, de l'Osborn Zoological Laboratory, Yale University, New Haven, Etats-Unis d'Amérique : un separata de ses travaux (a) Echanges d'eau et d'électrolytes chez un Pagure (*P. longicarpus*), extrait des Archives Internationales de Physiologie, 1938, Vol. XLVII, fasc. 1, pp. 1. 23 ; (b) Physiology of the alimentary tract of Arthropods (extrait de la Rivista di Biologia, Vol. XXIV, 1938 (XVI), pp. 1-62) ; (c) Secretions from ectodermal glands of Arthropods (extrait de The Quarterly Review of Biology, Vol. 13, No. 2, 1938, pp. 169-195).

9° De Monsieur le Docteur A. Cros, de Mascara (Algérie) : un separata de ses travaux (a) Description de la larve primaire d'un *Meloe* du Mexique recueillie par L. Diguet (*Meloe tropicus* Motsch.), extrait de la Revue Française d'Entomologie, Tome IV, fasc. 3, 15.9.1937, pp. 192-200 ; (b) *Odynerus* (*Ancistrocerus*) *atropos* Lep. (Etude biologique), extrait du Bull. de la Soc. Ent. de France, 1937, pp. 185-188 ; (c) Considérations Générales sur le Genre *Epicauta* Redtenbacher (Etude biologique sur *Epicauta albovittata* Gestro), extrait des Memorie della Società Entomologica Italiana, Vol. XVI, 1937 (XV, E.F.), pp. 129-144 ; (d) Sur une larve Meloïde d'espèce inconnue trouvée sur *Anthia cavernosa* Gerst. (Etude bio-anatomique), extrait du Bull. Soc. Roy. Ent. Egypte, 1937, pp. 153-166.

Le Conseil remercie les généreux donateurs.

Admission :

Monsieur Rizk Attia, de la Section d'Entomologie du Ministère de l'Agriculture, proposé par Messieurs le Professeur H. Priesner et Antoine Cassab, est admis à faire partie de la Société en qualité de membre titulaire.

Constant temperature Hot Air Sterilizer for the control of *Ephestia* and *Myelois* on dates

(with 1 Text-Figure, several Tables, and 5 Plates)

by Dr. MOHAMED SHAFIK,
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INTRODUCTION

Date-palms grow all over Egypt in all kinds of soils. In this country dates may be divided, according to their quality for sale, into four classes:

1. Fresh dates include numerous varieties which are eaten fresh.
2. Sticky dates (Agwah) which are pressed before they completely dry up.
3. Semi-dry dates include the dates that are subjected, to more than the above mentioned class, to the process of drying and can be packed in more or less a loose condition.
4. Dry dates including all the hard dates that have been completely dried up.

This paper deals with the last two classes, as they include the varieties which are subjected to the attack of *Ephestia* and *Myelois*.

In the sticky dates however, the insect attacks the outside layer of the pressed bale only.

The semi-dry date varieties are mostly produced by the Oasis and known as Saidi.

Giza and Fayoum also produce a variety known as Sewi dates, that of Sharkia Province is known as Amry.

The dry hard dates are produced by the Oasis and also by the Aswan Province.

The semi-dry dates are collected from the trees just after or a little before ripening. Then they are spread on mats made of palm leaves and left exposed to the sun for drying up. They are shuffled every one or two days.

After a period of about 15 days the dates are ready to be compressed by hand in sacks made of palm leaves and then stored ready for the market.

The crop ripens from early October to the middle of November. The infestation starts during the process of drying of dates. The exposure of dates

for the long period of drying offers a good breeding place for date moths. The insects continue their life-cycle in the village stores and also on rejected dates left out on the drying yards.

Siwa seems to hold the record for the highest infestation of dates amongst the other Oasis.

In the Amry dates in Sharkia the infestation is much higher because they are left exposed to dry for a longer time.

The hard dates are left on the trees to dry where they are subjected to the attack of the insect which continues its life cycle after the dates are stored.

The supply of chemicals to these far places, and the Oasis, is laborious. Furthermore the process of fumigation needs an experienced man to carry it out in a specially built air-tight room. This is apart from the cost of treatment and danger of handling highly inflammable materials such as carbon bisulphide.

This sets the writer to think of a method, for the control of this pest. which is simple and easy enough for the ordinary man to carry out.

Sterilisation with hot air suggested itself and the construction of a special room made of mud bricks and run at any regulated temperature was tested for this purpose and proved to be satisfactory.

Review of literature

It appeared that the use of hot air against insects was one of the early methods applied by many workers for the control of stored products insects.

Dear, G. (Journal Econ. Ent., IV, 1911) suggested the use of heat for the control of mill insects. Goodwin, W.H. (Journal Econ. Ent., VII, 1914, p. 313) explained the factors that affect the results in the use of high temperature for the control of insects injuring cereal products. Gibson, A. (Proc. Ent. Soc. Brit. Columbia, IX, 1916, p. 83) used super-heating as a control method for insects which infest stored products. Headlee, T.J. (Rep. Dept. Ent. New Jersey, Agric. Expt. Station, 1915 (1916), p. 486) worked out the effect of moisture upon lethal high temperatures. Gough (Bull. Min. of Agric., Cairo, VI, 1916) described an apparatus to kill *Gelechia* larvae by hot air and reported the effect of heat on *Gelechia* larvae and on cotton seeds.

Goodwin in his above mentioned paper (Journal. Econ. Ent., VII, 1914. p. 313) found that temperatures of 45-47° C were high enough to kill many of the insects attacking cereals, but if humidity was high many survived.

The resistance of stages to heat varies according to the insect, but generally the dormant stage endures the heat more than the others. *Ephestia kühniella* was killed by either dry or moist heat. Exposure to 45-48° C for 15-20 minutes killed all stages. In his conclusions he states that 50-55° C kill all stages of cereal insects if they are actually subjected to this temperature for 1-2 hours.

Gough (Bull. Soc. Ent. Egypte, Vol. V, 1917, p. 133, and Vol. V, 1918, p. 68) previously studied the same problem of *Ephestia* injuring stored dates in Kharga Oasis. He gave a short note on the life-history of this pest, a summary of which will help the reader to realise the amount of damage it causes to stored dates:

The larva of *Ephestia* attack the fallen or gathered dates. Eggs hatch on the 4th day in September. The young larva does not appear to be a boring insect, and usually enters the fruit from the calyx end and lives in the space between the stone and the cortex.

Larvae frequently enter and live in the space formed by a fold of the skin of a drying date. The shortest period for feeding is 20-21 days in September, after which the larva wanders about for about 2 days to find a place for spinning the cocoon.

The minimum period for transformation is five days in September. The pupal stage lasts about 5 days in September.

Copulation of adults takes place soon after emergence and oviposition begins after 24 hours. The female lays about 192 eggs in 24 hours. The egg laying period is about five days. The eggs of fertilised females are laid singly or in groups of two or three.

The length of the life of the males is about four days, of the females 10 days.

In October, the larval stage lasts over a longer period, and appear to hibernate after feeding; and spin their cocoons without pupating. Several larvae hatched from eggs laid in October were still larvae in February.

The whole life cycle from the laying of egg to the emergence of adult is as follows:

August: 25 days; September: 27 days; October: 38 days (minimum).

Gough recommended the use of heat or fumigation with sulphur dioxide in an air-tight box.

Gough believed that Saidi dates in the Oasis are not attacked by the *Ephestia* moth as long as the dates are still attached to the fruiting stem.

200 grams of sulphur on red hot charcoal are quite efficient in a box of 2 cubic metres. Fumigation in this way did not affect the texture, colour, or flavour of the dates.

Hase (Arb. biol. Anst. Land., Forstw., Berl., XV, 1927, p. 109) reported that the fatal temperature for the eggs of *Ephestia kühniella* is 34.4° C. Fatal time of exposure is very important because insects exposed to 45-47° C take several hours before they are killed; but if they are exposed to 60°C, they are dead after 5 minutes (Uvarov: Insects and Climate, p. 17).

Graham (Journal Econ. Ent., Vol. XVII, 1924, pp. 377-383) studied the individual variation in the fatal temperature on *Monchomus scutellatus* and found it to vary from 43-50°C for adults and 45-50° in larvae.

Combined action of tempature and humidity is an important factor in the resistance of insects to heat.

Bechmetjew (Staatsdruckerei, Sophia, XVI, 1907, pp. 944 + CVIII) stated that insects containing more water would die at a given high temperature more quickly than those with less water.

Uvarov states that an exposure to high temperature may very often have no apparent immediate effect on the vitality of an insect, but the subsequent developement and the length of life are often very seriously affected even by short exposures. He also mentions that there is considerable evidence to show that the intensity of heat may affect an insect in a different way according to the relative humidity of the air which in itself depends on the temperature.

In all cases higher humidities proved to be favourable in as much as they rendered the insect less susceptible to heat. This does not always follow.

Goodwin (Bull. Ohio Agric. Expt. Station, 1922, p. 354) when studying the application of heat for the control of mill insects found that in a practically saturated atmosphere the fatal point was 2-4° lower than in normal.

Mokrzecki, Z. (Dosweadczalnictivo Rolnicze: Agric. Expt. Station, VI, 1930) working on the biology and control of *Ephestia elutella* Hb. on tobacco, recorded that dry heat of 50° C is effective.

He also used HCN and SO_2. The latter is produced by burning 8 oz. of sulphur per 100 cubic feet capacity on hot plates with the addition of 10% $Na\ NO_3$ to help burning of sulphur.

Boselli, F.B. (Picentino, LXXXIX, No. 1-3, Salerno, 1933) working on the control of the Dried Fig Moth (*Ephestia cautella*) concluded that fumigation with carbon bisulphide or with a mixture of 6 volumes carbon tetrachloride and 4 volumes ethylacetate is effective. One kilo of $C\ S_2$ was used to treat 3/4 a ton of dried figs in a box of 1.700 cubic meter for an exposure of 60 hours. The other fumigant was used at the rate of 500 ccs. of the mixture per 1 cubic meter.

Norris, J.M. (Proc. Zool. Soc. London, December 1933) working on the factors influencing the fertility in *Ephestia kühniella* Z. reported that the abnormality of unsuccessful pairing is caused by exposing the pre-pupae or pupae to high temperatures (27°C or above). Exposure of earlier stages and of adults is without effect.

Harukawa, C. and Kumashiro, S. (Ber. Ohara Inst., Kurashihi, 1934) working on the control of *Sitotroga cerealella* Ol. exposed various stages of this insect to a temperature of 60°C. Eggs were killed after an exposure of 5 minutes, but 1-1½ hour was necessary to ensure complete mortality of larvae and pupae. At 80°C only 15-20 minutes were required to kill almost 100%.

Mansbrige, G.H. (Ann. appl. Biol., XXIII, No. 4, November 1936) carried out some experiments on the resistance of the flour moth (*Ephestia*

kühniella) to abnormally high temperatures. Eggs were heated at 47° C, the larvae and pupae at 45° C, and the adults at 44° C. Insects after experimenting were kept at 27° C and 70 % (approximately) R.H. He noticed that in all stages of *Ephestia kühniella*, there is individual variation in the resistance to heat which is most noticeable in the eggs and larvae. Factors affecting the survival of eggs to high temperature are : age, number of eggs heated together, humidity, and individual variation. There is decrease of resistance with age at 45° C, and eggs are less resistant at low humidities, and there is always a chance for eggs treated in a patch to cool down than when scattered.

No marked difference was noticed in the resistance of eggs if they are kept at a high or a low humidity before heat treatment.

Larvae heated at 45° C were killed after the following exposure : newly hatched larvae, 25-45 minutes ; feeding larvae, 20-40 minutes ; last stage larvae 1¾ to 2 hours.

Larvae which survived the heating at 46 °C for one hour failed to pupate. Pre-pupae when heated did not die at once, but remained showing some sign of life for 1-2 weeks. This seems to show that the cause of death is not directly due to heat, but to an interference with moulting.

Pupae survived heating at 45° C for one hour and the biggest survival appears to be at low humidity. Adult females are more resistant than the males at low humidities.

The following Table shows the time of exposure needed for a complete kill of the various stages at 45° C :

STAGE	1 - 8 % R. H.		70 % R. H.		95 % R. H.	
	Hours	Minutes	Hours	Minutes	Hours	Minutes
Fggs one day old........	6	--	7	.	3	—
Eggs three days old.	1	—	—	30	1	15
Newly hatched larvae.....	—	25	—	45	—	25
Feeding larvae...........	—	40	—	40	—	35
Last stage	1	45	2	—	1	45
Pre-pupae	1	—	1	15	1	—
Pupae	1	45	2	15	2	—
Adults ♀♀ and ♂♂ ...	—	43 & 23	—	45 & 45	—	15 & 15

Spreading of date moths in Egypt

Date moths are more prevalent on dry and semi-dry dates and could hardly be found on fresh dates.

Sharkieh Province dates known as "Amry" are found to be attacked by *Ephestia calidella* and by *Ephestia cautella* (Gough, Bull. Soc. Ent. Egypte, Vol. 5, 1917) which differ in habits from the *Ephestia* of the Oasis according to Gough. The larva of the *calidella* attacks growing dates, and bore its way into the interior but does not enter through the calyx. The larva of the *cautella* spins silk during all its larval stage. The larva attacking the dates of the Oasis does not spin silk and enters only through the calyx.

It has been stated by Gough that date moth does not actually attack the Saidi dates as long as they are still attached to the fruiting stalk. The writer has proved the contrary as shown on Figure 1 representing infested dates (Firehi and Saidi) collected from Siwa and Baharia Oasis.

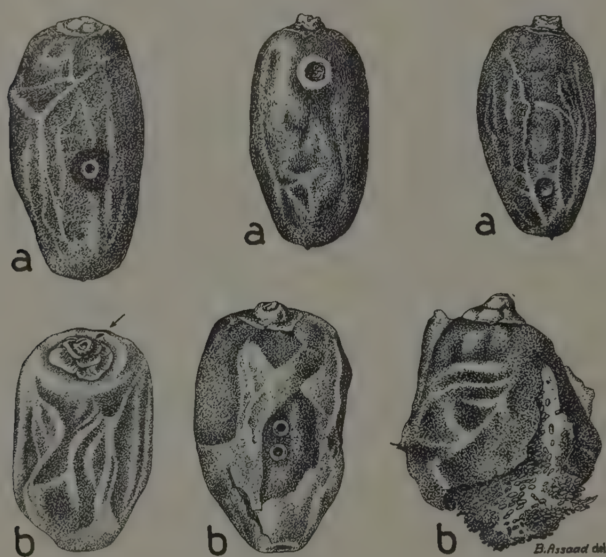


Fig. 1. — Firehi (a) and Saidi (b) dates intested by date moths.

Siwa Oasis is one of the good breeding places for date moths where the degree of infestation is always high.

At Dakhla and Kharga, the degree of infestation is not as high as that of Siwa, but much higher than that of the Baharia Oasis.

Identifications of date moths from Oasis.

Infested dates containing full grown larvae were collected at Baharia and Siwa Oasis by the author on 8th and 12th April 1938 respectively.

The moths emerged from either were submitted to Dr. Richards of the Imperial College of Science and Technology, London. They were later indentified by Dr. Richards and Mr. T. Reid, to whom I which to express my best thanks.

A collection of 125 specimens from Siwa Oasis contained the following species:

Ephestia calidella Gn.	48.8 %
Ephestia cautella Walker	2.4 %
Ephestia figulilella Gregs.	1.6 %
Myelois ceratoniae Zell.	44.8 %
Syria spec.	1.6 %
Euzophera spec.	0.8 %

Another collection of 67 specimens from the Baharia Oasis contained:

Ephestia calidella Gn.	44.8 %
Ephestia cautella Walker	4.5 %
Myelois ceratoniae Zell.	50.7 %

From the above list it appears that *Ephestia calidella* and *Myelois ceratoniae* are both to equal parts responsible for the damage done to the dates at Siwa and Baharia Oasis.

It is interesting to point out that *Myelois ceratoniae* is for the first time recorded in this country as a pest of dates.

Ripening of dates.

The dates which are eaten fresh are always picked up and consumed within a few days. Palms producing this kind of dates are scattered all over the country. Moreover, all date palms grown in lower Egypt except the Amry palms of Sharkia Province, produce fresh dates only.

The dry dates grown in the Oasis and at Assuan are left on the trees until they are nearly dry; then they are picked and spread out in the sun for 2 or 3 days and then packed in sacs.

The semi-dry dates are softer than the dry dates and contain 20-25 % moisture.

They are picked after they ripen on the trees or few days before; then they are spread in one layer over palm-leaf mats in a special place called ''mustah''. Every land owner at the Oasis has got this mustah for the drying of his dates. If dates are picked before complete ripening they are left exposed to the sun for 10-15 days, or 7-10 days if dates are picked after ripening. Then the soft and the more sirupy dates are collected and pressed by hand inside bags made of palm-leaves, and sold as sticky dates (Agwah). The harder ones are collected and sold as semi-dry dates.

The infestation is mostly due to the exposure of dates to the moth during the process of curing. The larvae are young when dates are sold early in the season. Bad quality dates are left in the mustah, and are usually fed to the cattle during autumn when green fodder is short. These, together with the dry dates which are stored for a long time inside the houses until they are sold, which are usually heavily infested, are a source of re-infestation for the next season.

Sticky dates (Agwah) which are compressed in palm-leaf bags are almost free from insects except on the surface.

The idea of spreading the dates in the sun serves beside curing the dates to reducing the moisture content to such a degree as to make dates keep longer.

Curing of dates

In curing of dates five processes take place:

1. Changing of cane sugar which is present in the unripe fruit to fruit sugars.

2. Changing of the soluble tannin to an insoluble form which has no taste.

3. The breaking down of the fibre in the fruit.

4. Drying of fruit until the amount of moisture left does not cause deterioration of the fruit.

If the curing is carried out by exposing the dates to the sun as it is done in the Oasis and at Assuan, it will help the infestation by the date worm moth; but if the curing is completed by heat, the out-door infestation will be avoided, and at the same time it is a mean for controlling the insect, if the correct temperature and time of exposure are chosen.

Dates contain two general forms of sugar: cane-sugar and fruit sugars (levulose and dextrose). Unripe dates contain principally cane sugar which is gradually changed into fruit sugars during the process of ripening. Excessive inversion of cane sugar will invert the dates into the sirupy form. The tannins which are present in the unripe fruit will also change into an insoluble form which has no taste.

The fibres present in the tissues surrounding the stone cavity can be softened by subjecting the ripened fruit to a relatively high heat, which breaks down and softens the fibre into a palatable date meat (Hilgeman & Albert, Univ. Ariz. Circ. 79, August 1936).

A good quality of dates can be obtained if the amount of reducing sugar content is kept below 25 %, and the moisture is reduced to about to 25 %. The fruit will never sour nor become sirupy (U.S. Dept. Agric., Bull. 193, September 1930).

Our object is to find out a simple method for controlling date moths on

dates specially in places where the drying and curing of dates is done by the sun heat.

The sterilization with heat is the simplest way for controlling such insects specially if we take into consideration that the handling of inflammable chemicals requires skill besides being poisonous to man.

A special cheap oven is designed by the writer to fulfill the requirements without causing any deleterious effect on the dates.

Before describing this oven and the way of treating the dates, a review of the literature will guide the reader to follow our means of control.

Sievers (U. S. Dept. Agric., Tech. Bull. No. 193, September 1930) on the ripening of the California Deglet Noor dates, prefers a temperature of 110° F or even 90° F for a sufficient length of time to eliminate the darkness of this fruit.

Albert and Hilgeman (Univ. of Ariz., College of Agric., Exp. Station Bull. No. 149, May 1935) studying insect control and ripening of fruit state that the insects usually attack semi-dry dates are the Indian meal moth (*Plodia interpunctella*), the two spotted fruit beetle (*Carpophilus hemipterus*) and the saw-toothed grain beetle (*Oryzaephilus surinamensis*). Fumigation with carbon bisulphide, hydrocyanic acid gas, or a mixture of carbon bisulphide and carbon dioxide were used for the last 10 years, but their use is discontinued because of the dangers involved in handling. Carboxide gas was lately used because it is non-explosive, and non-poisonous to man.

Effective insect control is obtained by subjecting the fruit to a temperature of 140° F (60° C) for 2-3 hours, before it is removed from the maturation room. However, the extreme temperature darkens the fruit, breaks down the juice cells, resulting in syrup exudation and is deleterious to flavour and quality. For these reasons high temperatures cannot be recommended except in cases where fumigation facilities are not available. He also states that dehydration is accomplished by raising the temperature and reducing the humidity in the maturation room immediately following the process of ripening to a temperature of 130-140° F (54.5-60° C).

Temperature of 140° F (60° C) darkens the fruit and is not recommended except for those varieties which have a natural dark colour or which have a very high moisture content.

Nuti Abdel Aziz (Ministry of Agric., Cairo, Circ. No. 53, 1936) states that drying of Saidi dates is carried out at a temperature of 150° F (65.5° C) until the moisture content is 24%, then by suddenly raising the temperature to 170° F (76.6° C) for 1 hour to kill the enzymes, which cause acidity and fermentation. He uses CS_2 for the control of date moths.

Hilgeman and Albert (Univ. of Ariz., College of Agric., Expt. Station Circular No. 79, August 1936) states that in curing and ripening, a temperature of 110-120° F (43-50° C) is required. Then fruits should be

sterilised at a temperature of 150° F (65° C) and not more than 160° F (71° C) for a period of $1\frac{1}{2}$-2 hours.

Dr. Postlethwaite of the Coachella Valley in a letter to the author states that for drying dates, air at a temperature of 150° F (65.5° C) and 30-35 % R.H can be used. The fruit on one layer trays should be subjected to a uniform distribution of air for the necessary time to take the moisture down to 20-25 % according to the variety of dates, then sterilized at 175° F (79.4° C) for 1 hour which will give in a properly designed dehydrator a temperature of 160° F (71° C) in the date meat, and will prevent future souring, and will not spoil the quality of fruit.

The author has tried a mixture of ethylene oxide and carbon dioxide (1 : 7) against date moths and it gave good results. Data on this work will be published later.

From the above mentioned work date moths can be well controlled by the following methods :

1. Chemically, and the materials recommended are carbon bisulphide, and ethylene oxide, alone or mixed with carbon dioxide.

2. Physically, by the use of hot air. A temperature above 160° F (71° C) is the upper limit for the safety to the fruit.

It is out of question to use fumigants, at the Oasis or in other parts of the country owing to the difficulties of manipulating the chemicals and the risk in using carbon bisulphide.

The sterilisation with hot air is simpler but needs an efficient and economic sterilizer.

The author has designed and built a special oven (Plates I-IV) made of mud bricks, simple enough that it could be built and manipulated by the ordinary man.

The causes of death of date moths during the rise in temperature was explained by Mellanby (Journal Exper. Biol. IX, 222, 1932), to be due to some internal reaction the products of which cannot be removed at high temperature. Two poisonous products may accumulate at high temperature ; carbon dioxide and lactic acid, as the result of increased respiration, and death at high temperature may be due to the accumulation of the above poisons.

Description of Oven

The drying chamber is constructed of double wall mud bricks and is rectangular in form with a slightly arched roof. The inside dimensions of the chamber are as follows : length 4.50, width 3.50 and height 2.10 metres.

The walls are 0.35 cms. thick, with 0.30 cms of air space between to reduce radiation losses.

The combustion chamber or fire box which is also made of mud bricks

is situated at one corner and is fitted with fire bars and also with a hinged iron door, 0.80 × 0.70 cms. Air is admitted through an adjustable hinged door (0.25 × 0.70 cms.) below the fire bars and consequently is compelled to pass through the fire. The fuel used is waste such as straw, broken wood, etc. Leading from the fire-box above the fire level is a 0.32 cms thick all welded iron pipe of 0.25 cms diameter. This pipe is carried round the chamber to and fro and sunk 0.05 cms below the ground level, and finally led into the chimney which is 6.30 metres high, constructed of sheet iron and ends with a cowl to prevent a down draft. The products of combustion pass from the fire box to the chimney through the welded pipe which is 9.57 metres long, and the drying chamber is therefore heated by radiation.

The combustion, and therefore the temperature of the chamber, is controlled by means of a simple butterfly valve situated half way up the chimney and which can be operated from the ground level by means of a chain. By accurate adjustment of this butterfly valve, the temperature of the chamber can be maintained with only slight variations for any period of time without difficulty. All control is simply by adjustment of the valve. The size of the air inlet is not of importance provided sufficient air is admitted to supply the desired amount of combustion. The drying chamber is closed with two doors one in front of the other with a vestibule between, 1.10 meter long, 1.00 meter wide, and 2.27 metres high. The doors are constructed of wood and covered from the inside with a thin and flat sheet of iron to hold the constructed pieces of wood together as one piece. They are 2.00 metres high, 0.90 cms wide.

A standardised thermograph of the Negretti and Zambra type was placed in the vestibule on a shelf between the two doors. The pipes were introduced through a special hole near the door and carried to the middle of the drying chamber hanging from the roof with the bulbs at equal distance between the roof and ground level. The hole through which the pipe enter was plugged with mud.

The temperature of the vestibule was always 3-5° C under the temperature of the chamber.

To heat the chamber, the fire box was filled with broken sticks or any dry weeds and broken wood. With this set a fire, and afterwards any kind of rubbish can be used, even green weeds or straw. Straw of dry beans or clover were found useful.

Air is admitted through the bottom hinged door, and the butterfly valve is also opened. Charging the fire box is continued until the temperature is 5° C above the required temperature. This does not take more than one hour, after which the hinged door and the butterfly valve are gradually closed.

Temperature will always tend to drop in the first few hours due to heat absorption by the walls. This will be compensated by slightly opening the

butterfly valve. After four hours, both the hinged door and the butterfly valve are completely closed. They will be only slightly opened when charging the fire box with fresh fuel. In the following days the temperature fluctuations are small even if the heating is stopped overnight.

A man who is used to manipulate this oven can control the temperature fluctuations to a degree not far from small electric incubator.

It was first thought that there should be a big difference between the thermometer readings in different corners of the chamber, due to air pockets and the large air capacity.

To test this, a glass jar filled with dates and a thermometer was placed inside so that the bulb of the thermometer would be held between the dates. This jar was placed in different corners and at different heights, and in every position the readings of the thermograph were recorded.

1. In the first experiment the chamber was heated, and after one hour, readings were recorded every 15 minutes as follows:

POSITION	THERMOMETER READINGS IN °C	THERMOGRAPH READINGS IN °C
South-west corner.......... ..	53.5 near chimney	51.5
South-east corner	49.0 near chimney................	50.5
North-west corner............	48.5 near fire box................	50.0
North-east corner	52.0 near fire box................	50.0
Near roof..................	48.0 near fire box.........	48.5
Near floor..................	47.0 near fire box..	48.0

2. In the second experiment, readings were recorded three hours after the heating of the chamber every 15 minutes as follows:

POSITION	THERMOMETER READINGS IN °C	THERMOGRAPH READINGS IN °C
South-west corner............	50.5 near chimney.................	51.0
South-east corner	47.5 near chimney.................	49.5
North-west corner............	51.0 near fire box...	51.5
North-east corner............	52.0 near fire box................	53.0
Near roof..................	48.5 near fire box...........	49.0
Near floor..................	50.0 near fire box................	50.5

The difference between the temperature in the centre of the chamber and in any other position did not exceed more than 2° C. The difference in temperature in the second experiment was not significant. We should also consider that the opening of the door every 15 minutes should disturb the temperature to a certain extent.

3. In the third experiment wet and dry bulb thermometres were hanged up near the thermograph bulb and the jar with the thermometer inside was placed at distances from the bulb. The results recorded were the following:

THERMOGRAPH READINGS IN °C	DRY BULB THERMOMETER READINGS IN °C	WET BULB THERMOMETER READINGS IN °C	JAR THERMOMETER READINGS IN °C	PERCENTAGE RELATIVE HUMIDITY	POSITION OF JAR THERMOMETER
30.0	30.0	24.5	31.0	62.0	Before heating
51.0	51.0	35.0	48.0	33.0	50 cms. from bulb
50.0	49.0	34.0	48.0	35.0	
49.0	48.0	33.0	47.0	34.0	
48.5	48.5	34.0	47.0	36.0	
51.0	52.0	35.0	49.0	31.0	34 cms. from bulb
50.5	49.5	34.0	49 0	34.0	
48.5	47.5	34.5	48.0	40.0	
49.5	51.5	34.5	49.0	31.0	

Recorded thermograph tables for a variety of temperatures which are shown and the small fluctuations for the long heating hours will suggest the accuracy with which this oven could be run.

Also the recorded tables of the thermograph for the self cooling of the oven after shutting off the heating will show the good insulation of the oven, and the very small amount of heat radiated, even with a great difference between the atmospheric temperature of the air and the temperature of the enclosed air.

The Thermograph Records (Plate V) given at the end of this paper show :

1. Lines recorded at different temperatures and along certain periods.
2. Lines recorded when fire is shut off and oven left to cool by itself.
3. The atmospheric temperature recorded at Dukki (Giza), at the time of heating and of cooling the oven from 19 to 29.11.1936.

Hot Air Experiments

The oven was heated and the temperature was adjusted to the required degree. Insects placed in jars were introduced into the chamber and placed at the height of the thermograph bulb in the middle of the chamber. Care was taken to open one door when the other is closed, and doors were not left open for long. After the exact time of exposure, the sample was taken out and left under observation at room temperature. Counts were made every 24 hours, and continued for a long period until the living insects had changed to the next stage of development.

Controls are kept at room temperature for every experiment and treated similarly.

Larvae

1. Larvae brought from Siwa Oasis in corrugated papers during February were counted 40 in each bottle, covered with muslin and introduced into the chamber. The result of examination was as follows:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF LARVAE TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
50-51	1	—	40	40	—	—
60-62	—	30	40	20	20	50
60-62	1	—	40	—	40	100
62-64	1	30	40	—	all	100
60-62	1	30	40	—	all	100
66	—	30	40	2	38	95
Control (at room temperature)			40	Alive	—	—

2. Infested dates were selected from a consignment of dry dates bought from the Oasis and treated as the above with the following results:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF INFESTED DATES TREATED	RESULTS OF EXAMINATION		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
62	1	—	100	—	6	100
65	1	30	100	—	5	100
63	2	—	100	—	7	100
61	2	30	100	—	7	100
64	3	—	100	—	2	100
62	3	30	100	—	6	100
Control (at room temperature)			400	5	5	—

3. The above experiment was again repeated using infested dry dates. Results were the following:

TEMPEPATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF INFESTED DATES TREATED	RESULTS OF EXAMINATION		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
61	1	—	100	—	6	100
60	1	30	100	—	6	100
62	2	—	100	—	5	100
64	2	30	100	—	4	100
65	3	—	100	—	2	100
62	3	30	100	—	3	100
Control (at room temperature)			400	5	3	—

4. Full grown larvae brought from Siwa Oasis on February 1937 were treated with the following results:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF FULL GROWN LARVAE TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
50	1	—	11	7	4	36.4
50	1	30	15	10	5	33.5
50	2	—	11	5	6	54.5
50	2	30	11	6	5	45.5
50	3	—	20	6	14	70.0
50	3	30	10	4	6	60.0
50	4	—	10	5	5	50.0
50	4	—	8	1	7	87.5
50	4	30	7	1	6	85.7
50	5	—	7	—	7	100.0
Control (at room temperature)			10	8	2	20.0
55	1	—	12	6	6	50.0
55	1	30	11	2	9	82.0
55	2	—	12	—	12	100.0
55	2	30	12	—	12	100.0
Control (at room temperature)			10	7	3	30.0
60	1	—	10	4	6	60.0
60	1	30	11	—	11	100.0
60	2	—	10	—	10	100.0
60	2	30	10	—	10	100.0
Control (at room temperature)			10	8	2	20.0

Pupae

1. Larvae collected from Siwa Oasis were left to pupate. Counts were made and each lot of 33 was put in a glass jar and treated in the chamber. The results are recorded in the following Table :

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF PUPAE TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
60	1	—	33	—	all	100
61	1	30	33	—	all	100
64	2	—	33	—	all	100
65	2	30	33	—	all	100
64	3	—	33	—	all	100
62	3	30	33	—	all	100
Control (at room temperature)			66	34	32	—

2. The above experiment was repeated with fresh pupae bred from larvae brought from Siwa and left to pupate at room temperature. Results were as follows:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF PUPAE TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
60	—	30	20	—	all	100
64	1	—	20	—	all	100
65	1	30	20	—	all	100
64	2	—	20	—	all	100
61	2	30	20	—	all	100
60	2	30	20	—	all	100
Control (at room temperature)			40	33	7	—

3. The above experiment was repeated again at lower temperature with the following results:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF PUPAE TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE KILL
	Hours	Minutes		Alive	Dead	
50	2	—	10	2	8	80
50	3	—	10	1	9	90
50	3	30	10	4	6	60
50	4	—	10	—	10	100
Control (at room temperature)			8	all	—	—

Eggs

It was rather difficult to breed date moths from the Oasis and we could hardly get a population to supply enough eggs for experimental trials.

Eggs of *Ephestia kühniella* were found in abundance and replaced the others in our trials.

Over 100 eggs were placed in sample tubes and introduced in the chamber for treatment. After right exposure, they were examined every 24 hours and young larvae hatching were counted and removed from the tube. After one month, eggs which failed to hatch were also counted. The results were as follows:

TEMPERATURE ON REMOVING THE SAMPLE FROM THE OVEN IN °C	TIME OF EXPOSURE		NUMBER OF EGGS TREATED	RESULTS AFTER 24 HOURS		PERCENTAGE DEAD
	Hours	Minutes		Hatched	Not hatched	
60	1	—	508	—	all	100
61	1	30	468	—	all	100
64	2	—	512	—	all	100
65	2	30	540	—	all	100
64	3	—	537	—	all	100
62	3	30	875	—	all	100
Control Number 1			1948	221	1727	100
Control Number 2			1074	168	908	100

Adults were very sensitive to high temperature and died at 50° C for 1 hour.

Summary and Conclusions

1. This mud-brick oven can be heated to the required temperature and kept constant to any period without difficulty.

2. The mud bricks make a good insulating material and fluctuations in temperature are small.

3. Different stages of date moths on dates can be well controlled if exposed to a temperature of 60° C (140° F) for 1 ½ hour in this oven.

4. Exposure to this temperature for a period of 1 ½ hour does not cause any bad effect on the quality of the dates.

5. Dates treated in this way kept their colour unchanged.

6. This oven could be easily applied for quick ripening and drying of dates instead of sun or mechanical drying.

Acknowledgment

I wish to express my thanks to the staff of the Insecticide Branch (Entomological Section, Ministry of Agriculture, Dokki (Giza) who helped me in carrying out the above experiments and to Prof. H. Priesner for his encouragement and valuable advice.

PLATES I-V

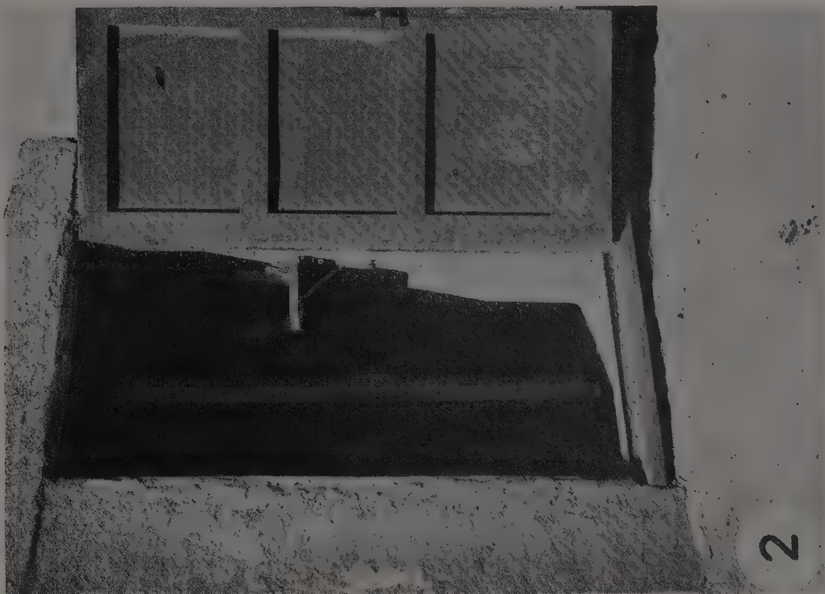
Explanation of Plate I

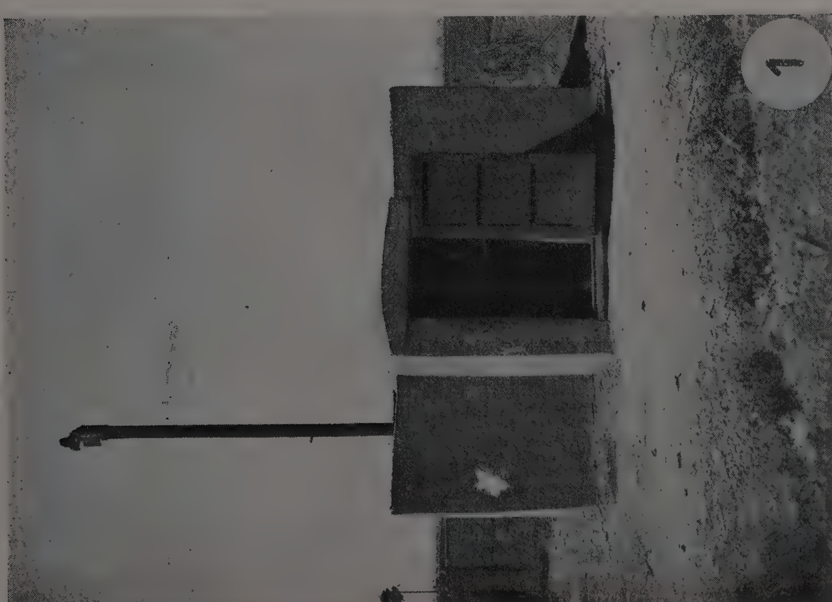
Constant temperature Hot Air Sterilizer for the control of *Ephestia* and *Myelois* on dates :

Fig. 1. — General view of sterilising chamber, chimney and air regulating valve.

Fig. 2. — Two doors and Thermograph.

Plate I





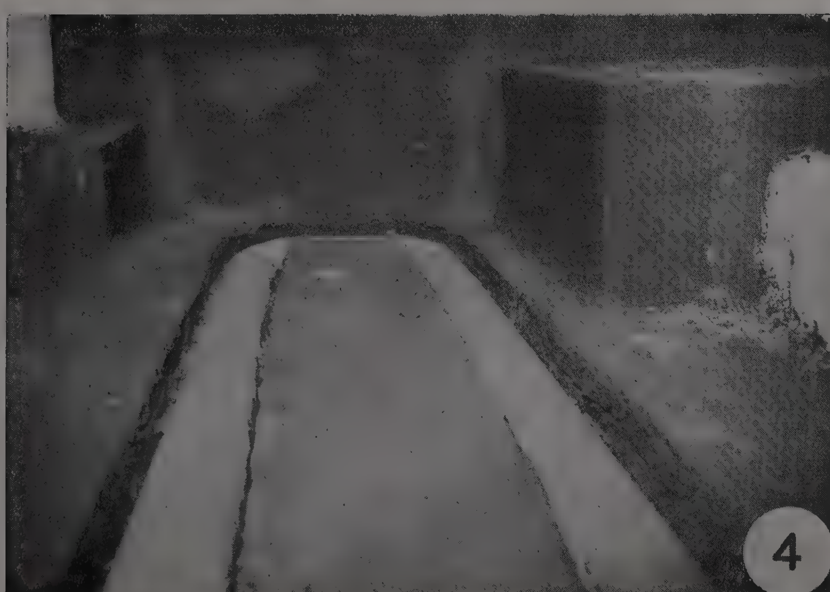
Explanation of Plate II

Constant temperature Hot Air Sterilizer for the control of *Ephestia* and *Myelois* on dates:

Fig. 3. — Combustion chamber door and adjustable hinged door for admitting air.

Fig. 4. — General view inside the chamber.


3


4

Explanation of Plate III

Constant temperature Hot Air Sterilizer for the control of *Ephestia* and *Myelois* on dates:

Fig. 5. — Part of heating pipe and way out.

Fig. 6. — Part of heating pipe and way in.


5


6

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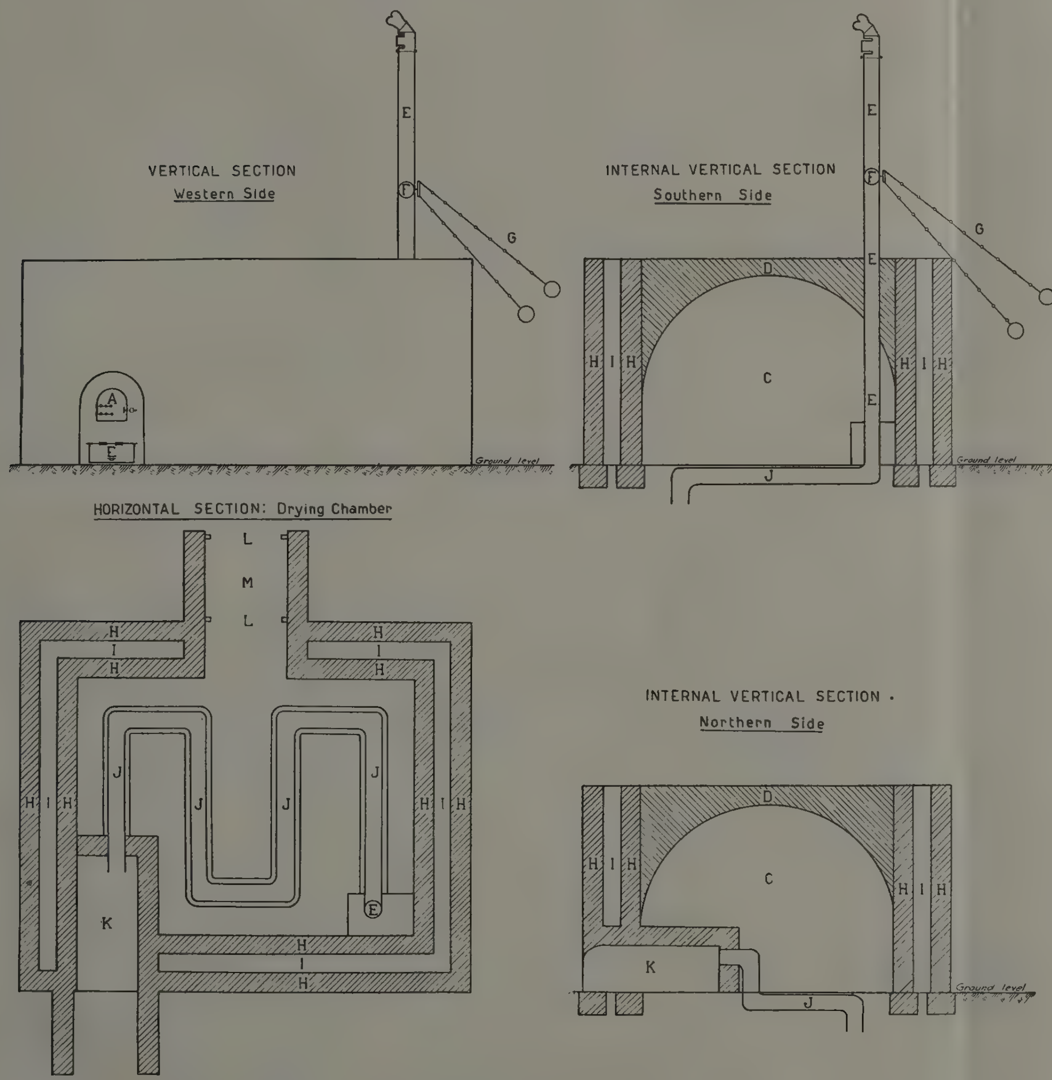
Plate IV

Constant temperature hot air steriliser for the control of *Ephestia* and *Myelois* on dates



A=Combustion chamber door; B=Adjustable hinged door below fire bars for air intake; C=Drying chamber; D=Mud brick dome; E=Chimney; F=Butterfly plate (temperature regulator); G=Regulating chain; H=Mud brick wall; I=Air space between mud brick walls; J=Hot air circulating pipe; K=Combustion chamber; L=Doors; M=Space of one meter between doors.

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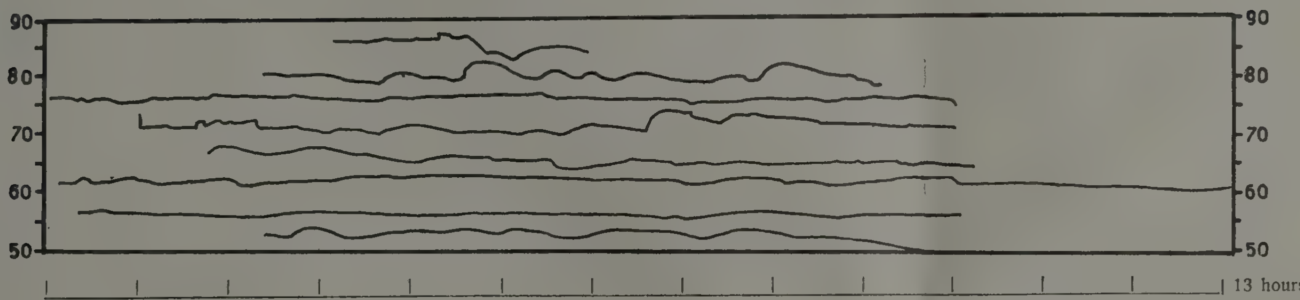
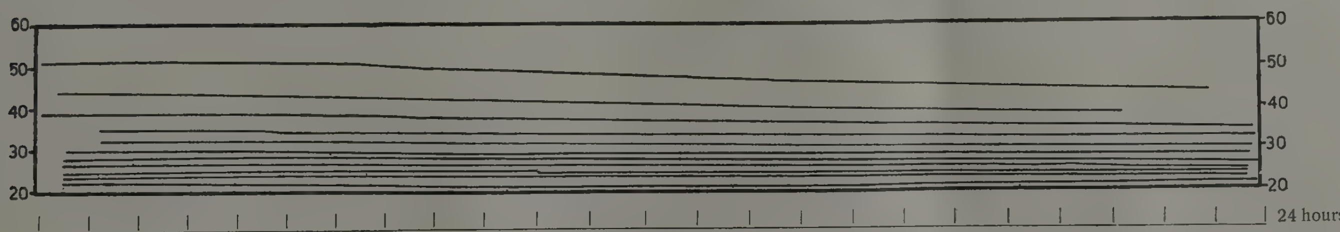
Plate V

Thermograph Records

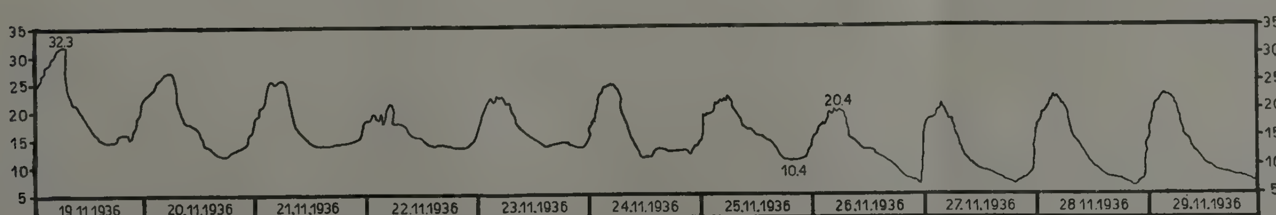
Lines recorded at different temperatures and along certain periods.



Lines recorded when fire is shut off and oven left to cool by itself during 11 days.



Atmospheric temperature recorded at Dukki (Giza) at the time of heating and of cooling the oven from 19 to 29.11.1936.



A mud brick oven for drying dates and controlling *Ephestia*

(with 1 Text-Figure, 4 Tables, and 2 Plates)

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The semi-dry dates, the Saidi of the oasis, the Sewi of Fayoum and the Amry of Sharkieh are all picked from the trees when, or a little before they are ripe. Dates are then spread on mats in the open exposed to the sun for ripening and drying. This is completed within 15 days. Although during this exposure they are subject to insects attack and contamination with dust, dates have to be partially dried in the field to avoid fermentation during the long journey to Cairo. The artificial drying is carried out by the Government Stations (the Horticultural Section and the Faculty of Agriculture), and also by one or more packing houses belonging to commercial firms.

Final drying takes place at Giza (near Cairo) by blowing hot air on dates laid in one layer on trays. The hot air draft is produced by an electric fan blowing the air over a strong heater to the trays. This process is continued until the moisture content of the dates comes down to 24 %. The temperature of the air is 150° F (66° C) and the time of exposure is approximately 5-7 hours according to the condition of dates. Before leaving the drying chamber, dates are exposed to a temperature of 170° F (77° C) for one hour, to sterilise them against organisms developing acidity and fermentation enzymes.

Furthermore, the transport of dates from the oasis to the drying chambers requires packing in large parcels and this causes a good percentage of dates being spoiled. It is therefore far better to finish the drying process and curing of dates on the spot. It is also important that this operation should be as simple as possible, with the least expenditure. The mechanical drying by means of blowers and special heaters is not an easy matter and needs experienced men to do the work.

A mud brick oven was designed by the senior author. It was built at Dokki and used with success for the control of insects on dates. This oven

can be built and used by the ordinary man of the oasis. The application of this oven for the drying of dates gave the best results with the least expenditure.

The oven is constructed of double wall mud bricks, 4.50 metres long, 3.50 metres wide and 2.10 metres high with 30 cms. air space between the two walls. It is heated through a fire box made of mud bricks. The air admitted passes through the fire box into a welded iron pipe of 25 cms. diameter to the chimney. The iron pipe runs forwards and backwards in the chamber below the ground level. The chimney is 6.30 metres and made of welded iron sheet. A butterfly valve is fixed half way up the chimney and is used to regulate the temperature of the chamber. This can be heated by any kind of dry weeds or wood. A detailed description of this oven and drawings are given in a previous paper (1).

The temperature found efficient for killing all the stages of *Ephestia* on dates was 140° F (60° C) for an exposure of 1.30 hour. The oven was also utilised for the drying of dates and our aim in this paper is to find out the result of the drying of dates in this chamber for different temperatures and length of exposure. The texture of the dates was examined and the amount of moisture left in the dates was accurately determined by special apparatus devised by the authors.

Review of literature

On ripening, cane sugar which is present in the early stages of dates is gradually converted to fruit sugars, depending on the temperature.

Forbes (1904, Arizona Agricultural Experiment Station, Annual Report 15) reported on the work of Slade, who discovered that dates could be roughly classified into cane sugar and invert sugar dates, and that Deglet Noor is a typical cane-sugar date.

Vinson (1911, Ariz. Agric. Expt. Stat., Bull. 66) continued the work on artificial processing of dates and was in favour of the treatment with chemicals.

Freeman (1911, Ariz. Agric. Expt. Stat., Bull. 66) working on the processing of dates by incubating at 120° F, found that most of the cane sugar was inverted. In using the low temperature to conserve the cane sugar, it required a long time and this increased the liability for sugar to become sour.

Swingle (1912, Comptes Rendus Acad. Sc., Paris, 155) was the first to draw the attention to the changes due to the slow action of moderate heat

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(1) *See* Dr. Mohamed Shafik : Constant temperature Hot Air Sterilizer for the control of *Ephestia* and *Myelois* on dates (this Bulletin, pp. 233-264).

that take place in the packing cases during the transport from the Sahara.

Drummond (1924, Date Growers Inst. Coachella Valley, California, Annual Report 1) reported that partially ripe Deglet Noor dates may be developed into a good marketable fruit by exposing the dates to a temperature of 90° F (32.2° C) for about five days.

Sievers (1930, U.S. Dept. Agric., Bull. No. 193) states that the progressive maturation of Deglet Noor dates in the heating process may be observed by the darkening of the skin and flesh, elimination of the rag and deposition of the tannin and the increase in the amount of reducing sugars. A temperature of 90-110° F for a sufficient length of time to completely eliminate the rag darkens the fruit too much and causes the inversion of enough of the cane sugar to produce a sirupy condition. It is evident that a temperature of 90-95° F with a relative humidity of 25-35 % will effect not only normal processing, but a benificial conditioning in fruit which contains considerably more moisture than is permissible for packing or storing houses.

If the reducing sugar content is kept below 25 % and the moisture is reduced to about 25 % the fruit is attractive in appearance, of normal flavour, and will not sour nor become sirupy.

Albert and Hilgeman (Univ. Ariz. Agric. Expt. St., Bull. No. 149, May 1935) states that temperature and humidity in the ripening chambers must be adjusted according to varieties of dates and to the degree of ripeness and moisture content of the fruit, and fruit containing high moisture content must be ripened with a higher temperature and a lower humidity, than fruit picked when atmosphere is dry. He recommends the use of an electrically heated chamber with constant temperature and constant humidity with a temperature range of 95-110° C and a humidity range of 60-80 per cent. The process of ripening is continued until the greater part of the fibre around the seed cavity is broken down into soft date meat. The length of time required to ripen dates properly will vary from several hours to three or four days depending upon the variety and the condition of the fruit at the time it enters the packing house. Dates with a moisture content of 25-27 % will keep indefinitely at ordinary room temperature. Dehydration is accomplished by raising the temperature and reducing the humidity in the maturation room immediately following the ripening process.

A temperature of 130-140° F is recommended; but the high temperature is confined to varieties of dark colour or varieties which have a high moisture content. The use of high temperature in dehydration completes the breaking down of the fibre around the seed cavity and improves the flavour.

Hilgeman and Albert (1936, Univ. Ariz. Agric. Expt. St., Circ. No. 79) state that dates contain two general forms of sugar; cane-sugar and fruit sugars, largely levulose and dextrose. Green dates contain cane-sugar and as fruit ripens it gradually changes into the fruit sugar form. This

change begins on the tree and is completed in the heater. Fibre or rag surrounding the seed cavity can be largely removed by subjecting the ripened fruit to a relatively high heat which breaks down and softens the fibre into a palatable date meat. Dehydration to a moisture content not exceeding 30 % will keep the fruit without perishing. They recommend temperatures of 110-120° F for ripening of dates. If the flesh is soft and pliable maturation is complete, and if the flesh feels hard and brittle the fruit must be left in the ripener for a longer period.

Nuti (1936, Ministry of Agric., Cairo, Circ. No. 53) states that ripening can be completed in a special room of double walls, running at a constant temperature of 100° F and a constant humidity of 50 %. The time necessary for complete ripening depends on the condition of the fruit, but he noticed that the washing of dates before introducing to the ripening room helps the process of ripening. After ripening, dates are sterilised at a temperature of 170° F for one hour. The drying is carried out mechanically at 150° F until the fruit contains 24 % moisture and then sterilized at a temperature of 170° F for one hour.

In our opinion, semi-dry dates in Egypt, take a big step towards ripening, before they are collected from the tree.

This may be due to the rise of temperature at that time of the year (October and November) in the localities growing this kind of date.

It is surprising to know that dates collected directly from the trees (before drying) contain about 30 % moisture. They are of a soft texture and contain small quantity of fibre. Exposure to heat in this case is simply to give the dates the final touch of ripening and drying.

Saidi dates picked directly from the trees at Bahria oasis and at Fayoum were brought to Cairo packed in wooden boxes.

They were sampled and were exposed to dry heat in the mud brick chamber for different temperatures and different times of exposures. After the correct time a sample was removed in a glass stoppered bottle cooled at room temperature and the amount of moisture was accurately determined. The amount of moisture content was also determined in a sample left at room temperature as a control.

Before describing our apparatus it is necessary to discuss the methods used for the estimation of moisture in dates.

Moisture is usually determined in different materials by drying the material tested to a constant weight and considering the loss in weight as water present. This always leads to erroneous results.

Substances other than water may be liberated by heat, due to partial decomposition or oxidation during the process of heating. This is always the case in sugary materials like dates.

Marcusson (1905, Mitt. kgl. Material prufungsamt, 23, p. 58) was

the first to determine moisture by distilling the sample with a liquid which is immiscible with water. Rogers (1910, Bur. Chem., Bull. 137, p. 172) proposed using Toluene for the determination of moisture in leather.

Dean and Stark (1920, Ind. and Eng. Chem., 12, p. 486) devised an apparatus whereby the sample was distilled under a reflux with a liquid immiscible with water, and water collected in a graduated side tube, and the solvent is returned to the flask.

Bidwell and Sterling (1925, Ind. and Eng. Chem., 17, pp. 147-149) found that the graduated tube is not sufficiently accurate for determining small quantities of moisture. By reducing the diameter of the calibrated receiving tube it has been found that the column of water can be read with sufficient accuracy for a wide variety of products. Distilling with Xylene especially in dried fruits gave higher results. Xylene boils at 139° C and this high temperature breaks down the sugars and other substances easily decomposed and set free the water which is the result of this chemical decomposition, leaving the distilled material in a charred condition. They substituted Xylene with Toluene which boils at 110° C and this gave them comparable figures within one hour.

Postlethwaite presented before the meeting of the Date Growers Institute of California (April 1936) the following method for determining the water moisture: 25 grams of a representative date meat cut into small pieces and weighed into a flask, which contains enough Xylene, to amply cover the date meat. The flask is attached to a reflux condenser and to a drip trap graduated to a cubic centimeter. The contents are heated and left to boil for 20 minutes. The quantity of water collected in the trap is read directly, which multiplied by 4, will give the percentage moisture content in the date meat.

Another method recommended by the Association of Official Agricultural Chemists is as follows:

A sample is prepared by passing the fruit after removing the stone through a food chopper, three times, mixing thoroughly after each grinding. Five grams are accurately weighed in a weighed metal dish approximately 8.5 cms., provided with a tightly fitted cover. The dish is heated in a vacuum oven at 70° C for 12 hours, under a pressure not exceeding 100 mm. of Hg.. During the drying a slow current of dry air is admitted at a speed of two bubbles per second. Cover replaced and dish is cooled in a dessicator and then reweighed.

The authors have tried the method of Dean and Stark for the Estimation of moisture in dates, by distilling a weighed quantity of chopped dates with excess of Xylol, and collecting the water in the graduated side tube.

The figures obtained were always high, owing to the high boiling point of Xylol and eventually, the decomposition of the sugars.

The products after long distillations were left completely charred with no taste of sugar, and the moisture content was about 50 % higher than the correct amount.

The method recommended by the Association of the Official Agricultural Chemists was modified by us and tested for dates.

Apparatus for the estimation of moisture in dates

This apparatus (Fig. 1) consists of a round bottom strong glass, 100 ccs. capacity, with short and wide neck. This is to be heated on a water bath running at 70° C and the flask is connected to a water pump to reduce the pressure inside the flask and a slow current of dry air is admitted during the experiment.

Air is dried by passing over a tower of calcium chloride (A), and bubbling through concentrated sulphuric acid kept in two bubblers (B). It then passes

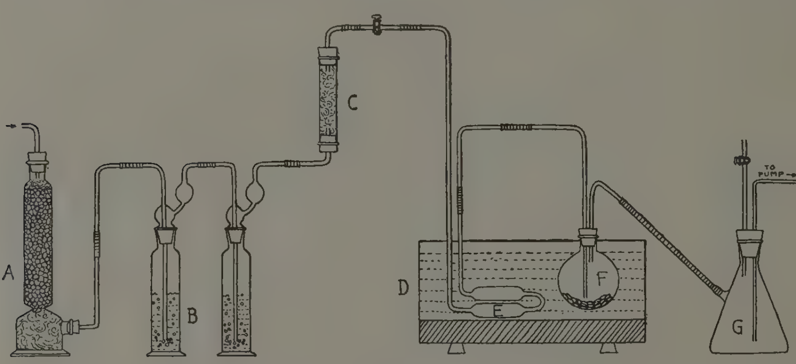


Fig. 1. — Apparatus for the estimation of moisture in dates : (A) Calcium chloride tower, (B) Concentrated sulphuric acid bubblers, (C) Cotton wool trap, (D) Water bath, (E) Air heating tube, (F) Container of dates, (G) Water trap.

over a wide tube (C) packed with cotton wool to avoid H_2SO_4 splashing. Then it passes into a U tube (E) immersed in the water bath (D) to raise the temperature of the bubbling air to 70° C, before being admitted to the flask (F). A trap (G) is connected between the water pump and the flask to avoid sucking back if the water pressure is reduced. The bubbling of air is regulated by means of a tap placed between (C) and (E).

Drying and moisture determination

The mud brick chamber was heated to the required temperature and dates were introduced into the heated chamber on trays placed in the middle

of the chamber. After the right time of exposure, a sample was taken in a glass stoppered bottle and left to cool at room temperature. Stones were removed and dates were passed in a food chopper for three times and mixed well after each grinding. About 5 grams were accurately and quickly weighed in the round bottom flask, which was then connected to the apparatus and heated on a water bath running at 70° C. The flask is also connected to the water pump and pressure was reduced to 100 mm. Air was admitted at the rate of 2 bubbles per second and after 24 hours the flask was disconnected, stoppered by a rubber cork, and re-weighed after well drying from the outside; and the percentage water content was then calculated.

Dates tested after this process were found to be quite normal. The colour was not changed and no decomposition had occured in the sugars.

The period for drying was supposed to be 12 hours, but this did not come in the working hours. It was found that an exposure of 24 hours suits our time of working and gave better comparable results.

Conclusions

Dates can be dried and ripening completed if exposed to heat in the simple mud brick oven.

Starting with dates that contain 29.300 % moisture, heating at 50-60° C for an exposure of 2 hours will reduce the moisture content in dates to the correct figure.

Semi-dry dates in Egypt have, as expected, a small moisture content and this is explained in Table IV where the moisture content of the treated fruit comes down to nearly 17.500 % in the mechanical drying processes.

The time of exposure as a rule can be regulated according to the amount of moisture in dates before heating.

Dates of 30-35° % moisture leave enough of it, if heated at 60° C for $1\frac{1}{2}$-2 hours. This temperature will also eradicate any living stage of *Ephestia* when the dates are exposed to heat in this chamber for the same period.

This mud brick oven can be utilised for both drying of dates and controlling *Ephestia* without leaving any deletorious effect on dates.

Acknowledgment

I wish to express my thanks to the staff of the Insecticide Branch who helped in carrying out the above experiments and to Prof. H. Priesner for his encouragement and valuable advice.

TAFLE I

Percentage moisture content of Saidi dates from Fayoum when heated in the mud brick chamber to different temperatures (55-80° C) and different periods (4-12 hours)

NUMBER OF SAMPLE	2 HOURS % MOISTURE	TEMPERATURE IN °C	4 HOURS % MOISTURE	TEMPERATURE IN °C	6 HOURS % MOISTURE	TEMPERATURE IN °C	8 HOURS % MOISTURE	TEMPERATURE IN °C	10 HOURS % MOISTURE	TEMPERATURE IN °C	12 HOURS % MOISTURE	TEMPERATURE IN °C
I	—	—	—	—	—	—	19.840	55.0	18.530	55.0	17.850	55.0
II	—	—	—	—	—	—	18.730	60.0	18.265	60.0	17.200	60.0
III	—	—	—	—	17.550	63.0	16.295	63.0	15.910	64.0	15.100	63.0
IV	—	—	—	—	17.270	70.0	16.350	72.0	15.500	71.5	14.940	71.0
V	—	—	18.370	75 0	17.100	75 0	16.000	75.0	15.300	75.0	14.050	75.0
VI	—	—	18.800	82.0	16.670	80.0	16.060	80.0	14.820	80.0	14.100	80.0

DATES FROM FAYOUM :
Dates before treatment contain 25.62% moisture

TABLE II

Percentage moisture content of Saidi dates from the Horticultural Section when heated in the mud brick chamber to different temperatures (50-85° C) and different periods (4-8 hours)

NUMBER OF SAMPLE	4 HOURS % MOISTURE	6 HOURS % MOISTURE	8 HOURS % MOISTURE	TEMPERATURE
I	19.540	19.200	18.650	50.0
II	19.340	18.660	17.750	55.0
III	20.020	19.880	18.730	60.0
IV	—	19.500	18.400	65.0
V	19.600	17.540	17.020	70.0
VI	18.630	18.050	—	75.0
VII	17.440	15.050	—	80.0
VIII	17.000	—	—	85.0

DATES FROM HORTICULTURAL SECTION :
Dates before treatment contain 22.70 % moisture

TABLE III

Percentage moisture content of Saidi dates from Bahria Oasis when treated in the mud brick chamber to different temperatures (50-70° C) and different periods (2-8 hours).

NUMBER OF SAMPLE	DATE	2 HOURS % MOISTURE	TEMPERATURE IN °C	4 HOURS % MOISTURE	TEMPERATURE IN °C	6 HOURS % MOISTURE	TEMPERATURE IN °C	8 HOURS % MOISTURE	TEMPERATURE IN °C
I	10.10.1936	25.250	49.0	24.900	51.0	24.620	50.0	23.700	51.0
II	10.10.1936	25.000	55.0	24.200	55.0	23.500	55.0	21.550	57.0
III	12.10.1936	23.400	60.0	24.000	60.0	22.000	59.0	19.600	59.0
IV	13.10.1936	23.000	66.0	22.000	64.0	20.350	64.0	19.800	63.0
V	14.10.1936	23.550	68.0	21.300	70.0	20.100	68.0	18.550	67.0
DATES FROM OASIS : Dates before treatment contain 29.30 moisture									

TABLE IV

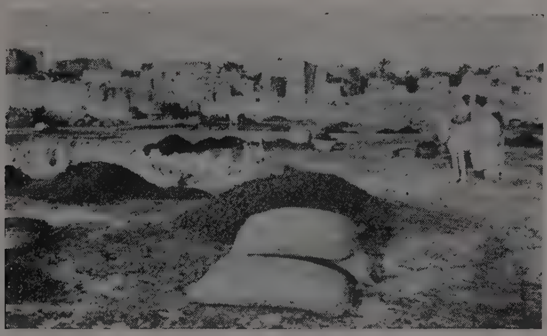
Percentage moisture in the finished dates sold at the market

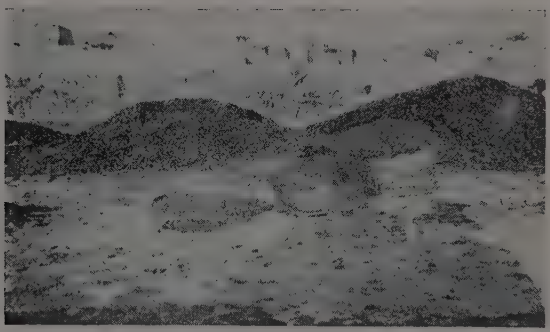
NUMBER OF SAMPLE	ORIGIN OF DATES	% MOISTURE	WAY OF DRYING
I	Horticultural Section not treated	17.470	Mechanical drying
II	Sela not treated	17.810	Mechanical drying
III	Sharkia not treated	21.030	Sun drying

Dr. Mohamed Shafik & A.L. Hilmi

Plate I

Baharia Oasis open air drying of dates





Siwa Oasis open air drying of dates

A brief note on the relation between the physiological condition of plants and insect attack

by Prof. Dr. H. PRIESNER

In a paper entitled "Conditions of the gradation of Insects" (Arbeiten über physiologische und angewandte Entomologie aus Berlin-Dahlem, Bd. 5, No. 3, 1938, pp. 229-255), H. Thiem reports on the relations of a scale insect (*Eulecanium corni* Bché.) to its host plants. As this article is an important contribution to our knowledge of the dependance of sucking insects on their host plants in general; and as I am able to confirm most of the conclusions arrived at by the author from my observations on other scale insects, and since some of his results are not commonly known, I thought it useful to publish in this Bulletin a brief English summary of the contents of particular interest in Mr. Thiem's paper, and to add some remarks on the subject under discussion.

The Plum Scale (*Eulecanium corni*), a very common insect in Europe, on deciduous trees, covering the bark of stems and twigs sometimes in great numbers, is one of those insects which are particularly susceptible to certain conditions of the host plant. Physiological conditions of the latter, naturally vary with the species or variety, and with the individual of the same variety as well.

(1) First of all, Mr. Thiem points out, if the insect appears in great masses at a certain place, the principal host plants are attacked, as *Prunus domestica*, *Fraxinus*, *Robinia*, *Ulmus* and *Cornus mas;* only later, the minor host plants follow : *Prunus spinosa*, *Crataegus*, *Prunus padus*, *Platanus*, *Salix*, *Juglans* and *Acer*. *Prunus domestica* can be used as an indicator for the insect at any given locality, as it is always the first to be infested.

(2) Plants, the roots of which are more or less submerged in stagnant subsoil water, are much more strongly attacked than others. Extreme dryness of the soil may have the same effect. The altitude in itself has no significance, as neither has the exposure.

(3) Scale insects living on resistant plants are smaller in size and lay fewer eggs than others living on susceptible hosts.

(4) Experiments on artificially infecting trees that were known to be free from attack, have given negative results. It appears therefore that scale-free trees must be physiologically different from those that are attacked. Every plant species has different conditions, as it either offers a suitable

breeding ground for the insect or not. In many cases only certain twigs or branches may be predisposed or susceptible (e.g., half broken branches, off-shoots of a stump).

(5) "Self-cleaning" of strongly infested trees was observed. (In some cases due to changes in subsoil-water conditions).

(6) Lime content or pH-value of the soil of attacked and free hosts was examined but no tangible difference seen. Comparative investigations (under consideration of the geological formation) by Welsch (1) have shown that it is the physical rather than the chemical condition of the soil that favours or checks the infestation. Soil, is in as far of importance as, e.g. pure sand or clay soil act in the same direction, pathologically. Thiem distinguishes between "resistance soils" and "infection soils", thus the following changes may occur.

(A) Infection soils can turn into resistance soils:

- (a) if in soils with too weak adsorption the water content is improved by interposition of soil layers of high adsorption power.
- (b) if in soils with too high an adsorption power the water deficiency is improved by interposition of soil layers of low adsorption power.

(B) Resistance soils can develop into infection soils through deterioration of their favourable crumb-structure:

- (a) by accumulation of silt or by agglutination,
- (b) by unsuitable soil covering (e.g. asphalt),
- (c) by interposition of soil layers with too high adsorption power (e.g. gypsum).

(7) Trees strongly infested by one scale insect may be at the same time attacked by a series of other species of scale insects or insects of other groups. Even insects with biting mouth-parts may "distinguish" between weak and strong plants (e.g. weevils, ants).

(8) The plant *species* may have influence on the development of both sexes or only one sex of the scale insect. (Of *Eulecanium pulchrum*, common on *Taxus* and *Thuja* — trees growing side by side — males occur on *Taxus* only, never on *Thuja*).

According to Thiem we can distinguish between permanent and fluctuating mass-infection, the former prevailing:

(A) If host plants remain in "infection soils" or also sometimes if young plants are involved.

(B) Fluctuating mass-infection:

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(1) Welsch, I.: Die Massenverbreitung der Pflaumenschildlaus (*Eulecanium corni*) und ihre Ursachen.—Landw. Jahrbucher, 84, pp. 431-492, 1937.

(a) if the roots of older plants reach deeper layers of an infectious nature; young plants remain free from attack,
(b) if older plants reach layers of "resistance-character"; older plants get clean,
(c) if resistance soils turn into infectious ones by getting soaked or by drying out,
(d) if infectious soils turn into resistant soils by drainage, suitable treatment or manuring.

Thiem further points out that plants may be absolutely or "geno-immune", or relatively or "phaeno-immune" to certain insects. The difference only consists in that with the phaeno-immune plants their range of adaptation or reaction is more distant from the vitality of the pest than in the phaeno-immune plants. If in praxi such phaeno-immune plants are to be dealt with it is the work of the cultural technique to avoid the susceptible phase of their range of reaction by choosing the locality or changing soil conditions.

"The difficult physiological problem of the alteration of the physiological conditions of plants should be more worked out in future by plant physiologists. That there exist in a plant fluctuations of physiological conditions pertaining beyond the difference in individual hereditary predisposition can be taken as proved from a biological point of view, and it is beyond speculation and philosophy. It is the exact physiological expression for it that is yet missing".

***

To the above abstract on the principal points of Mr. Thiem's paper I should like to remark the following:

That the relations of many insects, particularly those of the sucking type to their host plants are extremely close, so much so that the insect is directly dependant on the physiological condition of the host, is well known to horticulturists rather than to entomologists.

The number of insect species responding to fluctuations of the individual life of the host must be enormous. The majority of scale insects, aphids, jassids, thrips and others are supposed to be most susceptible to changes in the "internal constitution" of their host plants. Thiem has shown that a plant must not necessarily get insect-susceptible if the *chemical* composition of the soil is altered and that it is more the *physical* state of the ground in which the plant grows. Stagnant water, suffocating the root system, an impenetrable pan or dryness act in the same direction and this solely. The "self-cleaning" of trees was repeatedly observed by me in Egypt with Citrus trees and vines, attacked by mealy bugs (*Phenacoccus hirsutus* Green and *Icerya aegyptiaca* Dgl.). Trees growing in the asphalted pavements of the streets of Cairo were suffering heavily from the attacks of various Coccidae.

The actual internal process that turns an insect resistant plant into a susceptible one is not known but must have to do with the chemical composition of the cell sap, the latter depending chiefly on the physical condition of the soil. The aim of our researches has to be an investigation on the direct causes for the differences in the constitution of the plant (cell sap) on the one hand, and the susceptibility (mouth-parts, digestive organs) of the insect on the other.

Von Tubeuf (2) has shown that most of the bark beetles (*Ipidae*) which are known to attack weak or sick trees are dependant on the sap pressure of the resin-passages, as the mother insect when trying to bore a channel into the bark finds further penetration impossible when resin issues in great quantities from the wounded tissue of a healthy tree, whilst it encounters little resistance from a sick tree which has a lower turgor.

Is it not that insects with sucking mouth-parts, particularly their tender larval stages are still more susceptible to the physical state of the cell sap? One should believe that every sucking insect at a certain stage is adapted to meet a certain degree of pressure, and the more tender their organs are for the absorption and digestion of liquid food, the more susceptible the particular insect will be to fluctuations in the osmotic conditions, and thus to the composition of the cell sap.

Experiments should be conducted for studying more closelv the dependancy of insects on the cell sap of their hosts. Comparative measurements have to be taken of the degree of cell sap pressure of infested and insect-free plants in various environmental circumstances, as a means of more accurately defining this interesting correlation between insect and plant. Relaxing turgor is very likely only one of the direct causes for converting an insect-free plant into an infested one. Naturally I do not believe that insects as the *Coccidae* can distinguish by means of their sense-organs whether a plant is a suitable host or not but that especially the infection experiments seem to prove that many insects — in some cases at least certain early stages — can simply not live on plants the cell sap of which has normal turgor, and therefore the normal chemical composition.

I should like to add one word about observations on one point that was only touched by Thiem in his paper, since he dealt with *Eulecanium corni*. a scale insect living on bark. I mean the fact that fast growing parts of plants are more strongly attacked (i.e. more susceptible) than slow growing ones. Though Thiem accurately studied the comparative density of the scale population on branches and twigs respectively, and found twigs and

(2) Von Tubeuf: Studien über Symbiose und Disposition für Parasitenbefall sowie über Vererbung pathologischer Eigenschaften unserer Holzpflanzen. II. Dispositionsfragen für den Befall der Bäume durch Pilze und Käfer (Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz, 43, 1933, Heft 6, pp. 257-357).

thin branches decidedly more strongly infested than thick ones (l.c., pp. 231-235), this fact does not necessarily prove that a difference in the cell sap is responsible for the susceptibility as the varying thickness of the bark alone may explain the difference in the density of the population on thinner and thicker branches, respectively. The phenomenon that fast growing parts are strongly preferred by insects to slow growing ones is better shown for example on those sap shoots issuing from cut tree stumps. These are known to be strongly favoured by all kinds of insects (aphids, jassids, mealy bugs, thrips). In this case as well we seem to have to revise our view of the cause of this phenomenon. We used to believe that the tenderness of the leaves of such offshoots was alone responsible for their susceptibility to insect attack but as we know from the results of comparative measurements of the cell sap pressure taken by plant physiologists, that fast growing parts have a lower turgor than slow growing parts, we may very well also assume that the lower resistance of the tissue is due to the decrease of its turgor, based on a marked change in the chemical composition of the cell sap.

As a pressure lower than the normal renders any plant tissue susceptible, it seems only reasonable to believe *that the more dilute condition of the cell sap* is the main cause for making the sap more "palatable" or acceptable to the insects, and in many cases a comparatively high concentration of the cell sap will be fatal to them or at least to their early stages.

Thus it is supposed to be the concentration of the cell sap — varying greatly within varieties, the individuals of one variety and even within the parts of one individual host — which permits or hinders perhaps not so much the proper working of the mouth-parts of the insects, as certainly the process of ingestion and particularly digestion, assisting in its turn or destroying the life of the insects. *The important point is obviously the alteration of the normal balance between the osmotic pressure of the absorbing tissues of the insect's alimentary canal and that of the sap of the plant tissue.* I may add that the more an insect gets adapted or specialized to a certain host, the more it will depend on it, and the more precisely it will react to any change in the cell sap structure of the host.

Séance du 16 Novembre 1938

Présidence de Monsieur le Professeur H. C. Efflatoun Bey, *Vice-Président*.

Migration de *Precis cebrene* Trim. en Egypte

(Lepidoptera-Rhopalocera)

par A. Honoré

J'ai eu tout récemment l'occasion de constater, en Haute-Egypte, un cas de migration très intéressant, d'autant plus qu'il permet d'ajouter une espèce au catalogue des Rhopalocères égyptiens, *Precis cebrene* Trim. (Nymphalidae-Vanessinae).

Lors d'un voyage à Kom-Ombo, du 14 au 28 Octobre 1938, mon attention fut attirée, tout d'abord en chemin de fer, après Silsilé, par des papillons aux couleurs assez vives, volant comme les Vanesses, d'un vol très capricieux, d'un arbuste à l'autre, le long de la voie ferrée.

Je retrouvai ce même papillon à Kom-Ombo dans les terrains de culture de la Société du Wadi Kom-Ombo, dans les jardins des habitations de la sucrerie voisine, et surtout dans une petite bande de terrain désertique entre les cultures du Wadi et les bords du Nil, à Bayara, où il volait autour des *Tamarix*. C'est dans cette zone que l'on pouvait bien constater que l'espèce était en migration.

Entre 10 heures du matin et midi, pendant une huitaine de jours, j'ai pu observer chaque matin de 30 à 40 individus allant isolément, d'un vol désordonné en apparence, mais en fait, orienté Sud-Nord. Le vent, plutôt faible dans la matinée a toujours soufflé du nord ; la température pendant cette période a été supérieure à 40° C. ; quelques jours avant, il y avait eu un refroidissement relatif à 30-35° C.

L'espèce se montrait farouche, difficile à capturer ; j'en pris quelques exemplaires, presque tous en mauvais état.

De retour au Caire, j'ai pu, avec le concours de Monsieur A. Alfieri, identifier le papillon comme étant *Precis cebrene* Trim.

D'après Seitz, il est répandu dans toute l'Afrique continentale au Sud du Sahara ; il est indiqué également d'Arabie et de l'Ile de Socotra ; l'espèce se trouvait donc, à Kom-Ombo, en migration hors de sa zone normale d'habitat.

Il n'y avait pas de capture connue à ce jour en Egypte proprement dite ; il existe dans la collection Alfieri un exemplaire du Gebel Elba, capturé du « 16 Mars à fin Avril 1928 », rapporté par Monsieur le Professeur H. C. Efflatoun Bey. Monsieur Alfieri a connaissance d'un deuxième exemplaire, de la même région « Wadi Beida, Gebel Elba, 19.3.1928 ».

Note : Pendant que le présent article était sous presse, Monsieur Alfieri a eu l'occasion de voir un exemplaire de *Precis cebrene* Trim. capturé à Nag-Hamadi (Haute Egypte), le 27.4.1938, par le Professeur Dr. H. Priesner. Ce spécimen fait actuellement partie des collections de la Section d'Entomologie du Ministère de l'Agriculture au Caire.

Notes on the Embryonic and Post-Embryonic Development of *Calandra oryzae* (Linn.) and related Coleoptera

(with 3 Plates)

by K. Mansour, D.Sc. (London),
Department of Zoology, Fouad I University, Cairo.

INTRODUCTORY

A paper by the present author (Mansour, 1927) on the development of *Calandra oryzae* (Linné) embodied the following results concerning the formation of the germ-layers and the fate of the endoderm:

1. The blastoderm-layer contains the rudiments of the three germ-layers.
2. The ventral groove represents the gastrula furrow.
3. The walls of the groove (middle plate) contain the mesodermal and endodermal elements.
4. The rest of the blastoderm (lateral plates) gives rise to the ectoderm.
5. The endodermal cells are budded off from the middle plate into the yolk, where they disintegrate.
6. The remains of the walls of the groove after the migration of the endodermal cells, form the inner layer, which is the mesoderm.

In the same paper it is maintained that the mid-gut epithelium of the larva develops from proliferations of the end of the stomodaeum and the end of the proctodaeum and is therefore ectodermal in origin.

During metamorphosis it was also found that the epithelium of the mid-gut of the adult appears de novo from the end of the stomodaeum and the replacement cells take no part in the formation of the mid-gut.

The results of the embryological studies are in many respects quite contrary to the orthodox views held by most zoologists and insect-embryologists in special. Also the mode of development of the mid-gut of the adult weevil is totally different from what was known to occur in other insects. It is no wonder therefore that the paper referred to above has stirred the interest of zoologists anew in the problem of the development of the mid-gut in insects and its theoretical implications. The battle over this problem has been raging since the publication of Ganin's work, 1874 and zoologists are divided into more than two opposing camps. Historical accounts have been

given (vide Nelson 1915, Mansour 1927, and Eastham 1930) and it will be quite superfluous here even to outline the main views.

Since the publication of the work mentioned above, on *Calandra oryzae* a number of authors have written on the subject of insect development. The results of these workers are neither agreeing with one another nor with those of the present author. A short review of these works and a criticism of the results has been published by the present author (1934, 1936). Two joint authors however, Murray and Tiegs have since published two important and voluminous communications on the metamorphosis of *Calandra oryzae* (Murray and Tiegs, 1935) and on the embryology of the same insect (Tiegs and Murray, 1938).

Concerning the appearance of the adult mid-gut during metamorphosis the observations of Murray and Tiegs confirm those of the present author (1927) with the exception of one point. This point concerns the replacement-cells. According to these authors the replacement-cells give rise to the mesenteric coeca. In the embryonic development the differences are greater. These authors concluded that there is no endoderm whatsoever in the development of *Calandra*.

These two points are so important in any discussion of the origin of the mid-gut and the fate of the endoderm in insects, that an answer is made imperical. This answer is here given accompanied by photo-micrographs.

Concerning the Embryonic Development.

The only attempt of a critical study of the embryonic development of *Calandra oryzae* other than that of the present is that of Tiegs and Murray (1938). As far as is clear from the description of these authors a gastrula furrows appears and the walls of this groove soon become totally invaginated and closed in by the approaching edges of the lateral plates. In this fashion two layers are formed:

1. The outer layer which they agree to as proper ectoderm.
2. The inner layer which they identify as mesoderm.

The endoderm according to these authors is lacking all together. Having failed to observe the cells described as endoderm by Mansour (1927) they conclude: "There is then no adequate reason for identifying any part of the inner layer of *Calandra* with endoderm" (p. 204). Also after a long discussion of the different views advanced by the different authors concerning the germ-layer formation in insects they state: "We conclude then that "endoderm" does not occur in the embryo of *Calandra*" (p. 225). This is a bold and contradictory assertion, since these authors describe a *gastrula groove*.

Great endeavours have been made so far by various authors to apply the germ-layer theory to the case of insects. The present author has previously (1927, 1934) pointed out the untenability of Kowalewsky's view

(1886) that the endoderm of insects divides into anterior and posterior masses. He has similarly rejected the hypothesis of Nusbaum and Fulinsky (1909) and lastly he criticized the view of Hirschler (1912) as to the two phases of gastrulation in the developing pterygote insect. In 1934 he also pointed out that Eastham in his review (1930) comes to a three-phase endoderm differentiation (gastrulation), instead of the two postulated by Hirschler, which is again unacceptable. Roonwal* (1936) in his study on *Locusta migratoria* proposes the term multiphased gastrulation and thus leaves the number of phases unlimited, a view which is similarly untenable.

Tiegs and Murray (1938) by concluding that "endoderm" does not occur in the insect egg sound an all together new tune. They themselves realise the difficulty of defending such a conclusion against the attacks of the supporters of the germ-layer theory, the gastrulation theory and the adherers of the biogenetic law. The position of these authors is made more difficult by their refusal to admit that the larval mid-gut which according to them also arises from the end of the stomodaeum and the end of the proctodaeum, as previously found by Mansour (1927), is ectodermal in origin. In a foot-note on page 224 they mention: "The present observations must not be taken as a support for the paradoxical assertions that the mid-gut, in cases where it arises from stomodaeum and proctodaeum is ectodermal; it is merely claimed that it cannot be endodermal".

Tiegs and Murray bring in their discussion the results of experimental embryologists and mention that according to Mangold (1925) a normal somite and mid-gut wall can arise from presumptive epidermis emplanted into a gastrula. Now, *is this presumptive epidermis endodermal to give rise to a portion of the mid-gut wall?*

The photo-micrographs published in Plate I show very clearly that three distinct layers are formed during the development of the embryo of *Calandra oryzae*. The innermost layer whose cells migrate into the yolk is the endoderm in the proper sense of the term.

The larval mid-gut of pterygote insects must be looked upon as a totally new structure. The proper endodermal cells having failed to give rise to the digestive epithelium, the end of the stomodaeum and the end of the proctodaeum have become the centres of proliferation which leads ultimately to the formation of this organ.

In the development of the mid-gut of the adult *Calandra oryzae* and related forms a similar process is again met with (Mansour 1927 and 1934, Scheinert 1933, and Murray and Tiegs 1935). The mid-gut

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(*) Mention must be made here of the error made by Roonwal in quoting the present author as a supporter of Kowalewsky's view regarding the endoderm problem in insects.

in such insects develops from the end of the stomodaeum and is therefore definitely ectodermal and not *ectodermal?* as Murray and Tiegs put it.

Concerning the Post-Embryonic Development.

Since the publication of Mansour's work on the development of the larval and adult mid-gut of *Calandra oryzae* and other weevils (1927) the mode of development of the adult mid-gut from the end of the stomodaeum has become better known. In 1934 a wider work by the same author showed that this type of development is far from being uncommon in Coleoptera, since it has been found to occur in a number of other families: Scolytidae, Chrysomelidae, Cerambycidae, Coccinellidae, Nitidulidae, and Cucujidae. Scheinert (1933) in his work on the micro-organisms of *Calandra granaria* followed out the development of the adult mid-gut in this insect and confirmed Mansour's results on *Calandra oryzae*. Murray and Tiegs (1935) in their elaborate study of the metamorphosis of the latter species come to a different conclusion as regards the fate of the replacement-cells and mention: "but his (Mansour) otherwise accurate account seems here to be at fault" (p. 425). According to these authors the replacement cells separate off from the rest of the epithelium, form a loose layer of delicate cells outside the collapsing mid-gut and are destined to form a layer of scattered cells on the outside of the regenerating mid-gut and ultimately form the mid-gut coeca. A revision of the process of mid-gut formation in *Calandra* and the other insects with a similar mode of development only confirmed my original view viz. the replacement cells take no part in the formation of the mid-gut. Other than the details mentioned in my works of 1927 and 1934 an important point is worth referring to. This point concerns the basement membrane in relation to the replacement cells. In insects, the wall of the mid-gut is invested from the outside with a muscular layer which is followed inwards by a basement membrane to which the epithelial cells are attached. In between the bases of these cells the replacement cells are arranged in groups. In other words the replacement cells are inside the basement membrane.

During metamorphosis, in *Calandra* and in all insects with a similar mode of development the basement membrane is separated from the muscle cells which are undergoing radical change. This membrane collapses round the degenerating epithelial cells with the old replacement regenerating cells. This process is even clearer in insects like *Rhaphidopalpa* (Chrysomelidae), *Carpophilus* (Nitidulidae) and representatives of the Coccinellidae. In these forms the basement membrane is quite obvious and is deep blue in sections stained with Mallory's triple stain. In all the preparations examined, not a single cell was found to pass to the outside through the membrane. The replacement cells in all these forms only form a more or less continuous

thin layer outside the degenerating epithelial cells and are followed from the outside by the crumbling basement membrane (Plate II, and Plate III, figs 9-12).

Another point in support of this conclusion is revealed by the study of *Anthonomus grandis* (the cotton boll weevil). The author had the chance to obtain a few preserved prepupae from the teaching collection of the Department of Entomology, Imperial College of Science and Technology, London. The study of these prepupae showed that during metamorphosis the crumbling mid-gut with all its layers recedes markedly from the developing posterior end of the stomodaeum, which ultimately gives rise to the adult mid-gut (Plate III, fig. 13 st.t.). Between the receding degenerating larval gut and the progressing stomodaeal end there is a comparatively big gap without any remains of cells. The development of the mid-gut takes place entirely from the new growth without any confusion with degenerating cells. The collapse of the old mid-gut in this fashion is probably due to the presence of mycetocytes (Plate III, fig. 13 myc.) in the mid-gut epithelium of this insect. The significant point however is the presence of a marked gap clear of any remains of the old gut and in which the adult mid-gut develops entirely from the progressing end of the stomodaeum.

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PLATES I-III

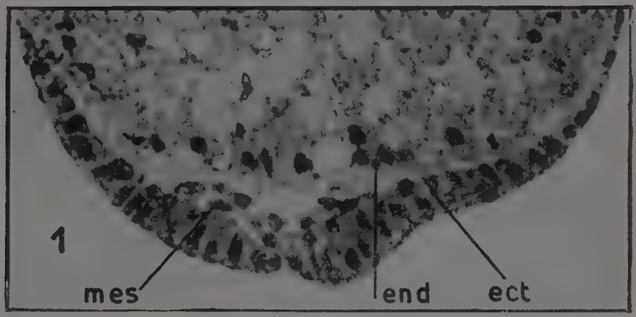
Explanation of Plate I.

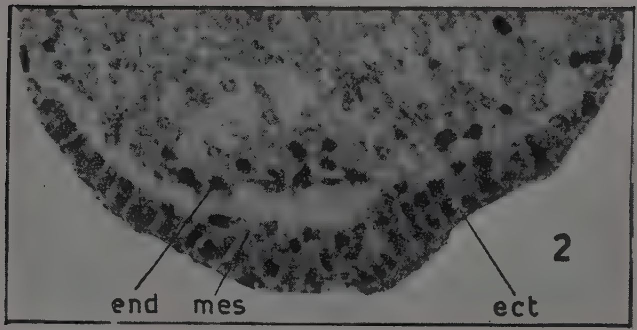
Figs 1, 2 and 3. — Ventral halves of three transverse sections of a developing egg of *Calandra oryzae* (Linné) showing differention of the three germ layers (× 425).

Reference letters: etc = ectoderm; end = endoderm; mes = mesoderm.

K. Mansour

Plate I





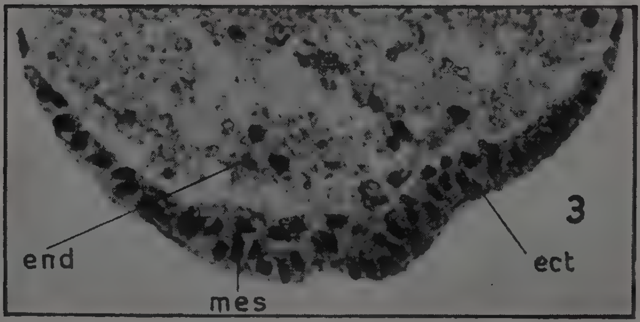


Photo-micrographs M. Melouk

Explanation of Plate II.

Fig. 4. — Portion of a sagittal section of an early pre-pupa of *Raphidopalpa foveicollis* (Chrysomelidae) showing the growth of the mid-gut tube and the degeneration of the larval mid-gut surrounded by the basement membrane (× 200).

Figs 5 and 6. — The same as Fig. 4 but of more advanced stages. — Note the receding basement membrane enclosing the remains of the larval mid-gut (× 200).

Fig. 7. — Portion of a longitudinal section through an early pre-pupa of *Carpophilus* spec. (Nitidulidae) showing the developing mid-gut tube and the receding basement membrane with the remains of the larval mid-gut (× 200).

Fig. 8. — Portion of a sagittal section through a pre-pupa of *Calandra oryzae* showing the developing mid-gut tube and the receding basement membrane surrounding the remains of larval mid-gut (× 80).

Reference letters: b m = basement membrane; mg t = mid-gut tube; myc = mycetocyte or mycetome; r l mg = remains of larval mid-gut; s c = separating cap or cells.

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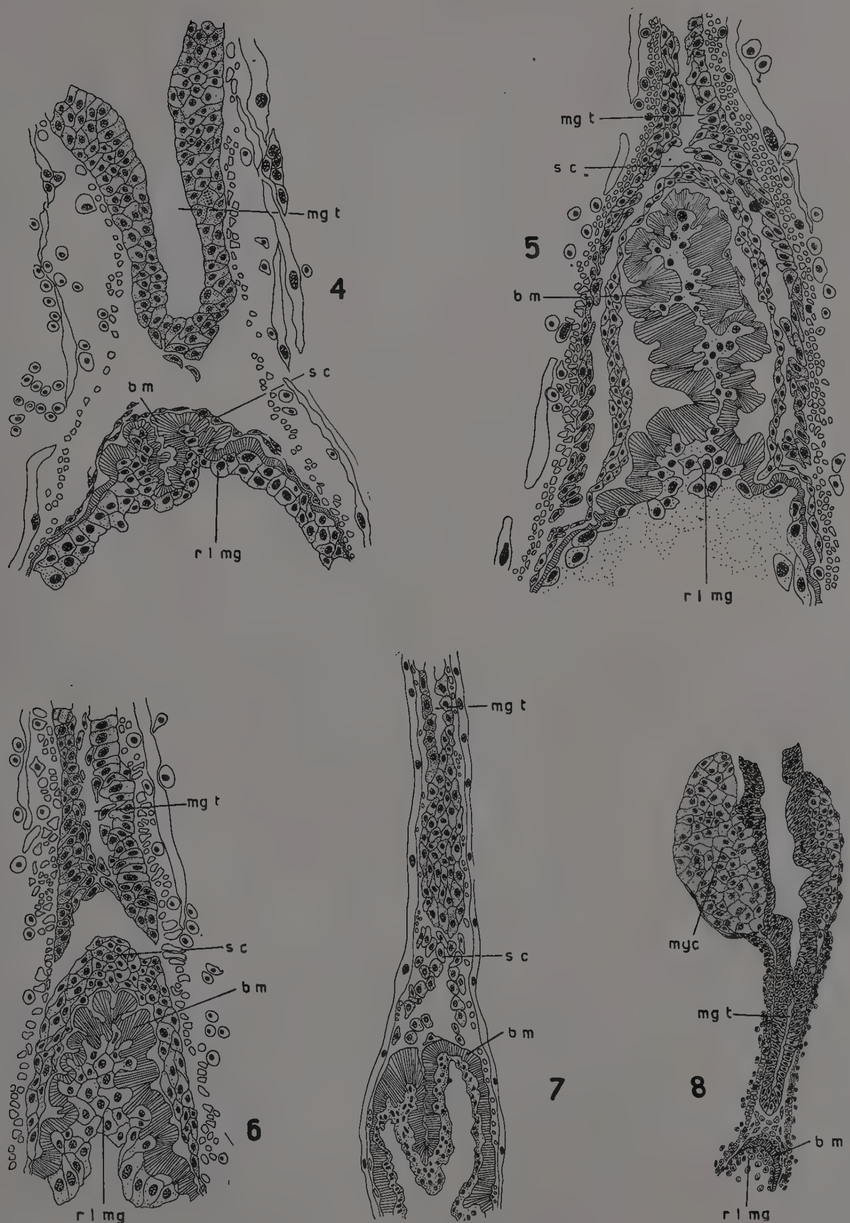
Plate II



Explanation of Plate III.

Fig. 9. — Photo-micrograph of the section of *Rhaphidopalpa foveicollis* Lucas illustrated by Fig. 4 (× 50).

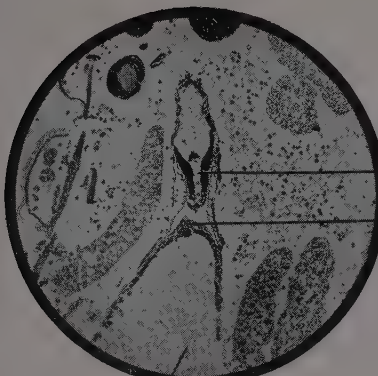
Fig. 10. — Photo-micrograph of the section of *Rhaphidopalpa foveicollis* illustrated by Fig. 5 (× 50).

Fig. 11. — Photo-micrograph of the section of *Rhaphidopalpa foveicollis* illustrated by Fig. 6 (× 50).

Fig. 12. — Photo-micrograph of the section of *Calandra oryzae* illustrated by Fig. 8 (× 35).

Fig. 13. — Photo-micrograph of a longitudinal section through a pre-pupa of *Anthonomus grandis* showing the developing mid-gut tube, the receding larval mid-gut epithelium with its mycetocytes (myc) and a comparatively big space between the end of the mid-gut tube and the remains of the mid-gut of the larva (× 200).

Reference letters: b m = basement membrane; mg t = mid-gut tube; myc = mycetome or mycetocyte; r l mg = remains of larval mid-gut; st t = stomodaeal tube.



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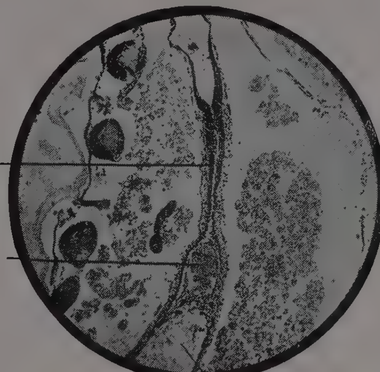

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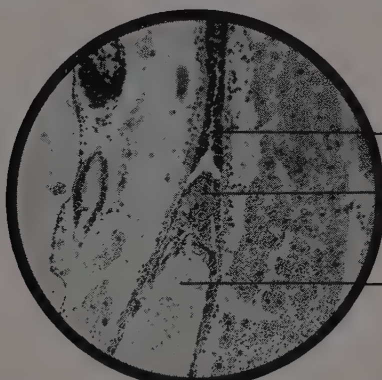

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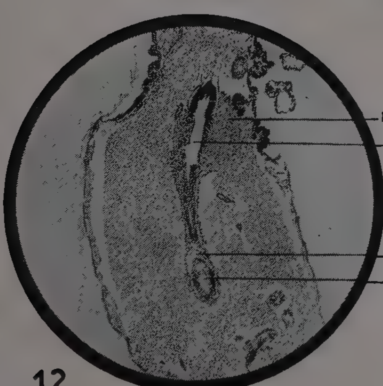

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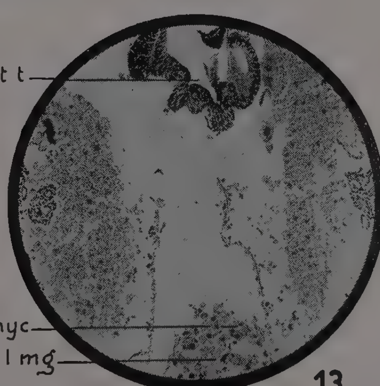

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Photo-micrographs M. Melouk

Efficiency of Commercial Sodium Cyanide and Sulphuric Acid in liberating Hydrocyanic Acid Gas for the Fumigation of Citrus Trees in Egypt against Scale Insects

(with 1 Text-Figure, 27 Graphs, and 23 Tables)

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INTRODUCTION

In a previous paper by Shafik and Amer (Tech. and Sc. Bull. No. 160, Min. Agric., Cairo, 1935), a study was made on this problem, using samples of sulphuric acid and sodium cyanide which were already used by the fumigation brigades at that time. The ratio recommended was 0.9 ccs. acid, 1.6 ccs. water, and 1 gm. of cyanide. Five grams of NaCN being used in all the experiments. The sodium cyanide used in fumigation was in lumps, each weighing 10 gms. For weighing 5 gms., one lump was broken to pieces. The strength of the acid used was approximately 87 % and the reaction was always helped with little shaking.

It was found later that sulphuric acid was bought in big consignments, and sometimes stored for over one year, and when analysed, the strength of the acid varied in different drums.

Even at the arrival of the acid fresh from abroad, its strength varied in the same consignment.

This encouraged us to investigate the matter fully, and we determined to study this problem in details.

The first step was to study the efficiency of the reaction when using dif-

ferent strengths of sulphuric acid, making Tables for the reactions of each acid strength and comparing the figures obtained.

Material used

Sulphuric acid used was of the commercial type, similar to the material used by the fumigation brigades, of the strengths 85, 87, 89, 91, 93, 95, 97, and 98 per cent. This was supplied to us by the Koninklyke Sulphuric Acid Manufacturers of Amsterdam, to whom we are much obliged.

The sodium cyanide used was obtained from the same material used by the fumigation brigades. It was in lumps, each weighing 10 gms., and supplied by the Imperial Chemical Industries. Later the I.C.I. sent us samples of special cyanide called the active cyanide, made of 10 grams lumps specially prepared for us. These cyanide lumps were supposed to be made of large size crystals which were not tightly fastened together.

The I.C.I. also supplied us with broken cyanide plates and with granular cyanide free of dust. All the cyanide supplied to us by the I.C.I. was free of charge and we wish to express here our gratitude to the above firm.

Powdered cyanide used in our experiments was obtained by grinding lump cyanide.

To avoid breaking one lump of cyanide into pieces, 10 gms. of NaCN were used in all our experiments.

Method and Apparatus for testing the efficiency of commercial sodium cyanide and sulphuric acid

The method used was the same as recorded in our previous paper (Tech.

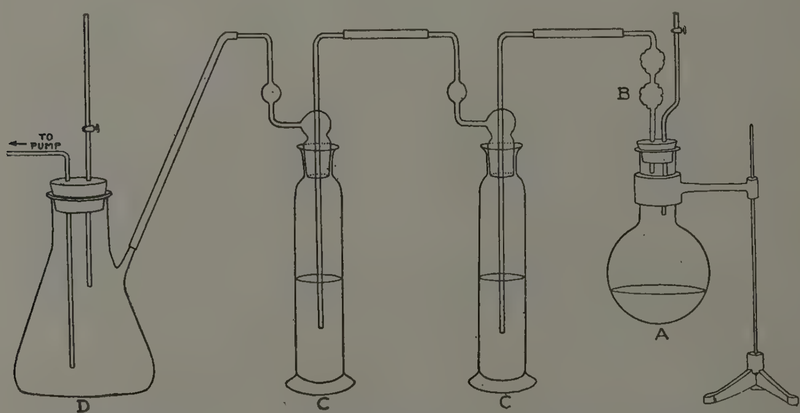


Fig. 1. — Apparatus for testing the effeciency of commercial sodium cyanide and sulphuric acid : (A) Round bottom flask (gas generator), (B) Reflux, (C) Bubbler containing caustic soda solution, (D) Water trap.

and Sc. Bull. No. 160, 1935), but the apparatus was slightly modified to suit our experiments as shown in Figure 1. It consists of a round bottom flask (A) of resistant glass, 100 ccs. capacity, and closed with a two-holes rubber cork, through one hole is inserted a glass tube about 20 cms. long with a stop-cock near the end, and bent at the middle of the tube as shown in the Figure. Through the other hole is inserted another piece of glass tubing 15 cms. long with two bulbs acting as reflux condenser to turn back to the flask the water evaporated by the heat of the reaction. This was found necessary to keep the concentration of the acid unchanged. The size of the tube and the bulbs were selected by experimenting. Several air and water condensers were tried and it was found that the selected type of bulbs gave the best results. Two bubblers were connected to this tube and the second was connected to a water trap which is connected to the water pump. The trap was simply used to prevent the sucking back due to change in water pressure.

Two bubblers each containing 115 ccs. of N/1 Na OH were found enough for dissolving all the HCN gas liberated.

Procedure

Ten grams of cyanide are weighed as previously and kept in a dessicator. The bubblers are half-filled with N/1 Na OH solution. The quantities of water and acid are measured and introduced respectively into the flask. A small plug of tin foil made in the shape of a cup is inserted inside the flask for a few centimetres down the neck. The weighed quantity of the cyanide is then introduced, resting on the tin foil.

The cork is placed in position, holding part of the tin foil between the neck and the cork, to avoid dropping the tin foil into the flask when pushing the cyanide. The cyanide is dropped into the flask, by moving down the glass tube.

The tin foil replaced the glass wool which was used in the previous work. Glass wool which forms a big surface used to hold some of the HCN gas and also occupies a space in the acid solution, and this left part of the cyanide uncovered by the solution. When the reaction is complete, the stop-cock in the side-tube is opened and a current of air is drawn to wash out the HCN gas into the bubblers. This is completed in 7-10 minutes. The contents of the bubblers are then emptied into a flask and titrated against a standard solution of silver nitrate, and the amount of HCN gas liberated is thus estimated.

Using 10 grams of NaCN, the acid ratio varied from 6-15 ccs. and the water ratio varied from 10-22 ccs. Tables are made for every acid strength.

Reagents and apparatus

The silver nitrate is a pure crystalline material which was bought from the British Drug Houses for Analytical work.

Graduated vessels are all of the standard type.

All experiments were treated the same, and the results being comparative, errors are eliminated to a minimum.

Reaction

The sulphuric acid reacts on the sodium cyanide and liberates hydrocyanic acid gas. The degree at which this reaction is completed depends on certain conditions which are summarised as follows:

(1) In a concentrated acid solution, the reaction is never complete and instead of HCN being liberated, formic acid is formed, which will break down into carbon monoxide and water.

(2) If the quantity of the acid solution is not enough, the reaction is always incomplete, even then, the HCN gas liberated being in contact with the NaCN, will polymerise forming brown solid substances which have the composition of HCN. This is also the case when the sodium cyanide is not completely covered by the acid solution.

Hydrocyanic acid in alkaline solutions deposits on standing, a brown amorphous compound, which is probably aminomalonic nitrile (CN_2 CH NH_2), whilst the alkyl cyanides yield di- and tri-molecular compounds (Cohen, Organic Chemistry).

The tendency for polymerisation exhibited by many members of the cyanogen group is analogous to their tendency towards formation of double compounds. The stability of the cyanogen solutions may be increased by acidification, and decomposition is indicated by the formation of brown decomposition products.

HCN should be acid, if in alkaline solution, it will be unstable and decomposition may be slow at first, but is catalysed by the products of the reaction (Allen's Commercial Organic Analysis, p. 470).

Ammonia, sodium hydroxide, sodium cyanide, and water act in catalysing the polymerisation of HCN. Sulphuric acid, and copper are classified as stabilisers (Ind. Eng. Chem., 1925, 17, 1074).

It is thus necessary that the HCN liberated from the reaction should be evolved as quickly as possible, if it is left in contact with the sodium cyanide present it will tend to polymerise.

The temperature of the acid solution is an important factor for the efficiency of HCN evolution. The speed and the efficiency of HCN evolution are reduced, if the mixture of acid and water is allowed to cool before introducing the cyanide (Imp. Chem. Ind., Report 1937).

It will be concluded from the above that the efficiency of the reaction

depends on the concentration of the sulphuric acid used, the tendency of HCN to polymerisation, and the temperature of the solution.

In our study we have considered the importance of the above three points which were thoroughly examined. Using concentrated acid solution the reaction was incomplete and the yield was low. For this reason and for practical and economical purposes, the range of the acid concentrations was limited in our experiments. The minimum acid concentration used in our work was 18 % and the maximum was 58.5 %.

The polymerisation of the HCN was detected in all the residues formed in our experiments. The quantity of this residue varied greatly according to the quantity of the acid solution present and its concentration; and also on the type and form of sodium cyanide used.

The temperature of acid solution was also found to be an important factor in the speed of HCN evolution. If the sodium cyanide was added directly after the acid was mixed with the water, when the temperature of the mixture was still high, the gas evolved quicker than if the mixture was left to cool. It was also noticed that the reaction was more vigorous in the former than in the latter where there is more liability for forming residue and polymerised HCN.

A study of Graphs I-IX which were plotted for the reaction of the highest acid solutions (Ratio: NaCN, 1 : H_2O, 1 : Acid 6-1.5) will show that there was always a steep fall in the quantity of the liberated HCN gas at a concentration of 39-42 % in all acid strengths from 85-98 %.

At this point of the curve the yield was the lowest. But if we look at the corresponding Tables representing the reaction of the acid strengths used, the same acid concentrations are giving higher yield of HCN gas at another point of the Table. For example, the lowest point on the curve in Graph VI is at the ratio of 1 cyanide : 1 water : 0.8 acid of 95.87 % strength. This point represents a yield of 3.645 gms. of HCN and an acid concentration of 42 %. The quantity of solution in this case is 18 ccs.

A glance at Table IX, will show that another concentration of 42 % lies at 1.25 acid and 1.6 water. The quantity of solution is 28.5 ccs., and the yield is 5.184 gms of HCN.

If we take another example on the same Table of the ratio (1 cyanide : 1 water : 0.7 acid of 95.85 % strength), the concentration is 39 %, the liquid is 17 ccs. and the gas liberated is 3.699 gms HCN. This concentration is also made by 12.5 ccs. acid + 18 ccs. water and the yield is 5.130 gms HCN.

The following figures illustrate the yield of HCN gas at small bulk and bigger bulk of acid solution of the same concentration:

Acid strength	Cyanide form in pieces	Percentage of Concentration of acid Solution	Ccs. of acid solution at low yield	Gms. of HCN liberated	Ccs. of acid solution at high yield	Gms. of HCN liberated
85.9	1	40.3	19	3.861	26.5	4.806
87.7	1	41.0	19	3.996	26.5	4.941
89.5	1	42.0	19	3.807	26.5	4.914
91.9	1	40.5	18	3.591	28.5	4.860
93.8	1	41.5	18	3 537	28.5	4.914
95.9	1	42.0	18	3.645	28.5	5.184
97.3	1	40.0	17	3.537	24.0	4.482
98.0	1	40.0	17	3.429	24.0	4.590

The difference between the high and the low yield in the above ranges is 20 to 30 %. This indicates that the concentration of the acid solution is not the sole factor in the efficiency of gas evolution, but also depends on the bulk of liquid used. The latter is the more important as shown above. The cyanide used in the above was in lumps each weighing 10 gms. in the form of half a sphere.

The lumps were not all of the same texture; some were made of large crystals, others are more compact; and some were found hollow; while some were grey in colour, others were white; some were found hard, and others were easy to break. Although they are nearly similar in the cyanogen content, but they react differently with the sulphuric acid solution. Cyanide lumps which are hollow or made of large size crystals, are less compact and are easily affected by the reaction and broken to pieces. The reaction here is much quicker than when treating compact or hard cyanide pieces. The yield in the former type is high, and the reaction is more complete, with no or little polymerised HCN, while in the latter form the speed of the reaction is slow, the yield is low, and the residue and the polymerised HCN are high.

This is specially seen in sulphuric acid ratios from 6 to 10.

This gave us the idea of speeding up the reaction; either by using other forms of cyanide which will react quickly, or by simply shaking the contents of the flask to help the breaking of the cyanide piece, and to avoid the keeping of HCN in contact with the cyanide surface for enough time to polymerise.

Analysis of different kinds and forms of sodium cyanide :

DESCRIPTION	Weight of NaCN	Ccs. N/10 AgNo_3	Percentage of NaCN
1. Dark from inside	10.9734	10.80	96.40
2. Covered with white layer	10.2623	10.03	95.80
3. Dark from outside	10.2869	10.12	96.40
4. All white	10.0928	9.90	96.80
5. Hollow	9.0978	8.97	96.60
6. Stale (3 years old)	9.0379	8.60	93.20
7. Fresh kind	8.6117	8.50	96.70
8. Hard kind	12.1990	11.70	94.00
9. Hollow	9.4142	9.25	96.40
10. Broken pieces	9.2563	9.10	96.40
11. Powder	10.0000	9.80	96.04
12. Granular	10.0000	9.91	97.10

Table V represents the result of the vigorous shaking of a 10 grams cyanide piece in acid solution and will show the high yield of the HCN gas, the quick reaction, and the absence of polymerised residue, at any acid concentration.

The cyanide piece was mostly of the hard type and the acid strength was 87.7 %.

Graph X, representing a ratio of cyanide 1 : water 1 : 0.6 - 1.5 acid of 87.7 % strength, and vigorous shaking, will show that the lowest HCN liberated was at a concentration of 46 %, with 20 ccs. of acid solution giving 4.654 gms. HCN. The same concentration is made of 14 ccs. water, and 15 ccs. acid and this yields 4.995 grams. This will show that the difference between the low and the high yield on this curve is not as big as in the others shown before. The difference between the high and low yield is only 7 % compared with 20 - 30 % as shown above, and the curve in this case runs completely above the line representing 4.650 gms. HCN, while in the previous cases it went down as low as 3.430 gms. HCN.

The next step was to try other forms of sodium cyanide. Large broken pieces were tried but the result was nearly the same as the 10 gms. piece. The results were tabulated as shown in Tables II and III.

The Imperial Chemical Industries supplied us with a sample of 10 gms. pieces which were stated to be of the active type, but there was no preference to the normal piece. Table X showed the results of this type of cyanide when used with a 95 % acid.

The powdered form of sodium cyanide was then used with a 95-87 % acid and the results were recorded in Table XI.

The reaction was complete in the majority of concentrations and the

yield was high. The chance for polymerisation with this form of cyanide was rather small. Graph XI represents the reactions at the ratio of cyanide 1 : water 1 : 0.6 - 1.5 acid of 95.87 % strength. The yield of HCN was always above 4.550 grams.

The vigorous shaking when using one cyanide piece, and also the use of powdered cyanide are both a means for speeding up the reaction. The results are nearly the same.

The use of powdered cyanide in fumigation work is not practical and the addition of powdered cyanide to the acid solution will cause splashing, and loss in the bulk of liquid.

We then thought of another type which will not lower the speed of the reaction and at the same time will not cause the splashing. The granular type was suggested and a sample was brought from the Imperial Chemical Industries. This was sorted into two sizes, one weighs 0.5 - 1.0 gm. per piece, and the other weighs 0.15 - 0.35 gm. per piece. The smaller size was the best in reaction. The average weight per 10 pieces was found to be 2.0 gms. Pieces weighing from 0.15 to 0.35 gm. will pass through 2 - 6 mesh.

Table XII will show the reactions of 95.5 % acid on the granular type of cyanide. It will be seen that the reaction is almost complete except in few concentrations. Polymerisation and residue were negligible.

The reactions of the concentrated acid ratio (1 cyanide : 1 water : 0.6 - 1.5 acid of 95.5 %) were shown on Graph XII, where there was a drop in yield at 0.7 acid, and sudden rise in other concentrations. The yield of HCN was always above 4.05 gms and in 0.9 - 1.5 acid it was above 5 gms.

Graphs XIII - XVIII will show a comparison between the yield of HCN gas when using the three forms of cyanide (one piece, powder cyanide, and granular cyanide) with an acid strength of 95.87 % and at varying concentrations. In Graph XIII, the ratio of cyanide to water was 1:1, and there was always a fall in the amount of HCN liberated in the three forms of cyanide with acid ratios 0.6 - 0.9. The lowest yield in the powder was 4.540 gms., in the granular 4.050 and in the one piece cyanide 3.650.

In Graph XIV the ratio of cyanide to water was 1:1.4, and the fall disappeared altogether from the powder, reduced in the granular and in the one piece with a yield of 4.630 in the granular, and 4.100 in the one piece.

In Graph XV, the ratio of cyanide to water was 1:1.6 and the fall was reduced still more in both the granular and the one piece with a yield of 4.900 in the granular, and 4.330 in the one piece.

In Graph XVI, the ratio of cyanide to water was 1:1.8 and the fall reduced more in the granular than in the one piece, with a yield of 5.000 gms. in the former and 4.580 gms. in the latter.

In Graph XVII, the ratio of cyanide to water was 1:2, and the fall disappeared in the granular, but was nearly the same as in Graph XVI for the one piece.

In Graph XVIII, the ratio of cyanide to water was 1:2.2, and both powder and granular kept ahead, and the fall was reduced in the one piece with a yield of 4.720 gms. HCN. The fall never disappeared in the one piece reactions, but it did in the powder and in the granular, with a preference in the granular in Graphs XVII and XVIII.

With an acid strength of 95.87 %, and ratio of cyanide to water 1:2, and a granular type of cyanide, the reaction was almost complete with any acid ratio from 0.6 - 1.5.

Another interesting study was to find out the reactive power of the acid solution on sodium cyanide (granular and one piece), and comparing the yield of HCN with the theoretical value.

The acid concentration was prepared and instead of adding the required quantity of sodium cyanide, 60 % of this quantity was added, and the HCN liberated was estimated and the residue was noted. The cyanide was gradually increased in every trial and the resulting figures were tabulated. Tables XV and XVI are for water ratio of 1.6; acid 0.7 and 0.8, with cyanide varying from 0.6 - 1.0 (granular and one piece). The figures under the column "comparative size of residue left", are arbitrary figures, giving zero for no residue, half for very small residue, one for small residue, two for residue of normal size, and three for big residue.

It will be seen in both Tables that in the one piece, the residue started to form in the 70 % cyanide ratio, while in the granular there is hardly any residue.

Tables XVII and XVIII are for water ratio of 1.8 and acid, 0.7 and 0.9 with cyanide varying from 0.6 - 1.0 (granular and piece).

The result was nearly the same as in Tables XV and XVI. Tables XIX to XXIII are for water ratio of 2.0 and acid 0.6 - 1.0, with cyanide varying from 0.6 - 1.0 (granular and one piece).

The results were nearly the same as before, but the residue in the one piece was less in these concentrations.

Graphs XIX and XX are plotted for Tables XV and XVI. The yield of the HCN in the granular forms a straight line nearly parallel to the theoretical yield which was represented as well on the curve. The one piece line is dropped away from the theoretical.

Graphs XXI and XXII are plotted for Tables XVII and XVIII and are very similar to curves on Graphs XIX and XX.

Graphs XXIII to XXVII are plotted for Tables XIX to XXIII. The granular is still giving a straight line parallel to the theoretical, and there is some improvement on the one piece line.

The curve representing the ratio (0.7 acid : 2 water : cyanide 0.6 - 1.0 granular) on Graph XXIV is a good curve, very near to the theoretical one. It will be seen from the above Tables that the residue in the one piece form of

cyanide started to form at 70 % of the total cyanide to be added, and the addition of a 100 % of the cyanide in this form will be simply a waste of material. In the granular the reaction is complete and with little or no residue.

Summary and Conclusion.

The efficiency of the liberation of HCN from the reaction of NaCN on commercial H_2SO_4 depends on the following factors:

(a) Concentration of sulphuric acid used.
(b) Tendency of HCN to polymerise.
(c) Temperature of acid solution.
(d) Quantity of acid solution.
(e) Speed of reaction.

The last item is dependent on the form of cyanide used. Powder cyanide and granular represent a good form of cyanide for high efficiency of HCN liberation.

For fumigation work, the granular cyanide that passes through 2-6 mesh is recommended, and the most favourable ratio will be cyanide 1 : acid 0.7 : water 2). The acid strength should be 95-96 %.

In case it is not practical to apply the granular in the field, a ratio of cyanide 1 : acid 1.25 : water 1.8 is recommended for acid 95-96 %. The ratio recommended by the I.C.I. (cyanide 1 : acid. 0.625 : water 1.6 for an acid of 98 % strength) can only be applied in the laboratory. The slightest error in measuring the water and the acid will shift it to the bad region of reaction. Acid of 98 % strength is more expensive than an acid of 95-96 % strength. In case a 98 % acid is easily obtainable at a reasonable cost, a ratio of cyanide 1 : acid 0.6-0.7 : water 2, is recommended for the one piece cyanide (see Table XIV). In using 0.7 acid instead of 1.25, there is a saving in acid of 44 % which will make 2430 egyptian pounds in the 510 tons of sulphuric acid used by the fumigation brigades per one fumigation season.

Before we close this we must refer to the efficiency of HCN as an insecticide against the scale insects on citrus plants.

It is understood that high kill in fumigation work against scale insects on citrus plants is attained, provided the HCN dose will reach its maximum within the first 2-3 minutes; otherwise stupefaction occurs and the insects will be resistant to the HCN gas. If the concentration of HCN allowed to creep up slowly under the fumigation tent then protective stupefaction occurs, i.e. if the concentration spreads slowly that it takes 10-15 minutes to reach its maximum height. On the other hand it has been proved that this stupefaction is prevented, if the gas concentration can be brought to a maximum

throughout the fumigation tent within 2-3 minutes (Peters, G.: Citrus tree Fumigation, 1934).

The speed of reaction then counts here very much and there is no doubt that with the granular cyanide the maximum concentration of the HCN gas under the tent is attained in due time and much quicker than in the one piece cyanide where the reaction is slower.

Acknowledgment

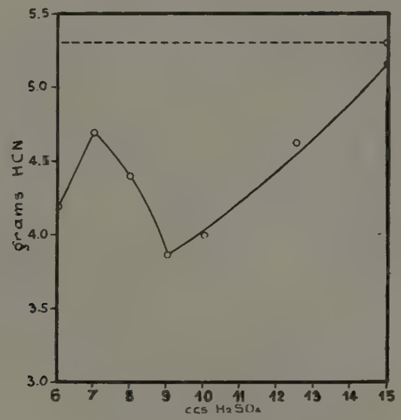
We wish to express our thanks to the staff of the Insecticide Branch, and to Prof. H. Priesner for his encouragement and valuable advice.

GRAPHS I-XXVII

GRAPH I

Sulphuric Acid Strength 85.88 %

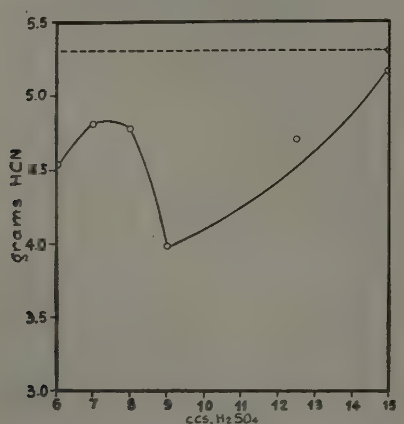
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.00 % purity) = 5.2897 gms HCN
Cyanide: One piece



GRAPH II

Sulphuric Acid Strength 87.66 %

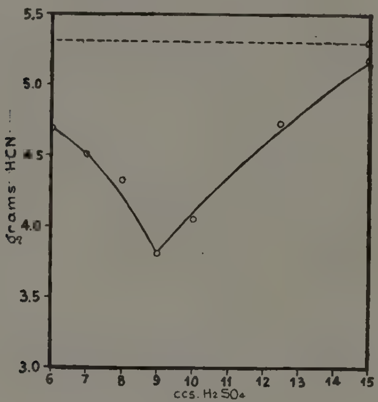
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



Graph III

Sulphuric Acid Strength 89.47 %

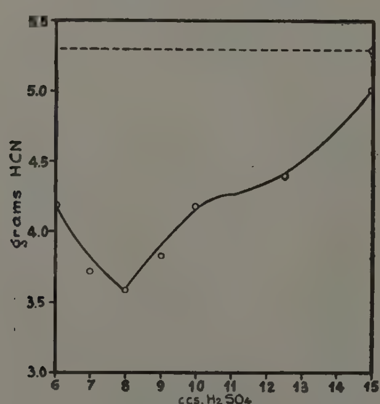
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



Graph IV

Sulphuric Acid Strength 91.87 %

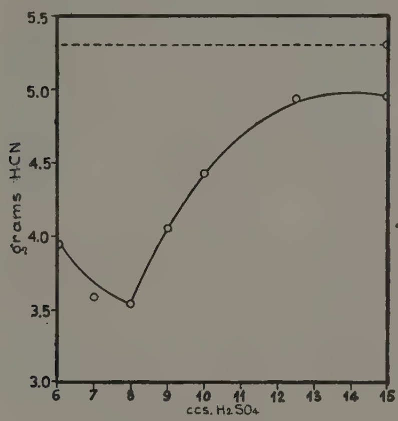
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH V

Sulphuric Acid Strength 93.75 %

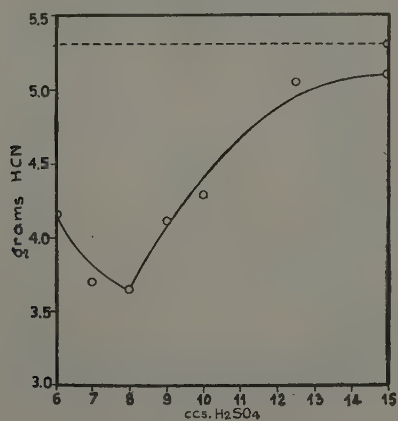
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH VI

Sulphuric Acid Strength 95.87 %

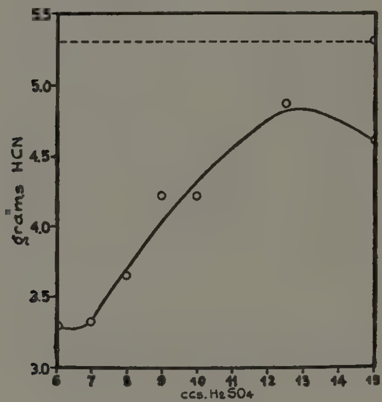
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH VII

Sulphuric Acid Strength 95.20 %

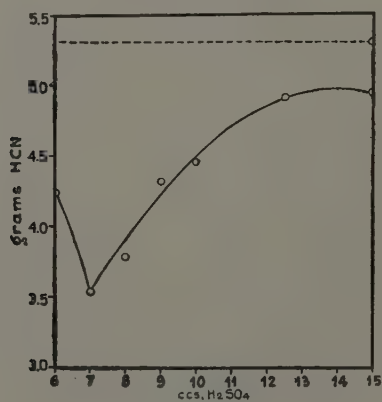
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece (I.C.I. Selected)



GRAPH VIII

Sulphuric Acid Strength 97.25 %

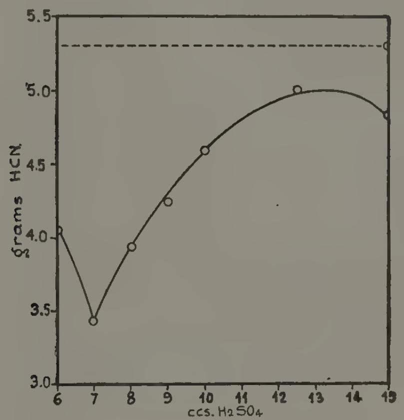
Ratio: Cyanide 1 : Acid varying (0.6-1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH IX

Sulphuric Acid Strength 98.00 %

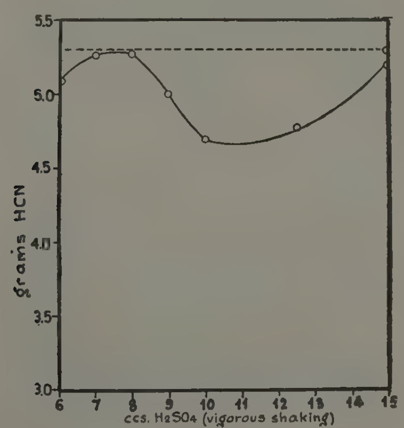
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH X

Sulphuric Acid Strength 87.66 %

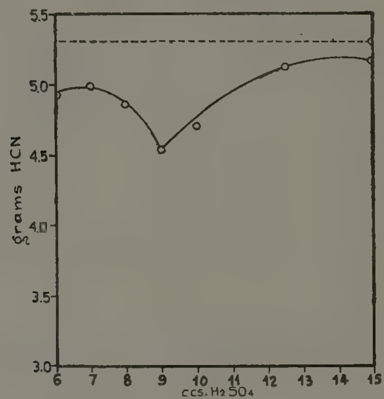
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: One piece



GRAPH XI

Sulphuric Acid Strength 95.87 %

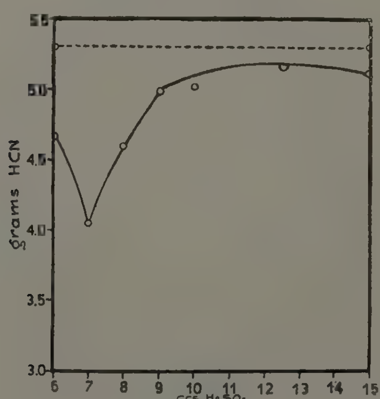
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: Powder



GRAPH XII

Sulphuric Acid Strength 95.50 %

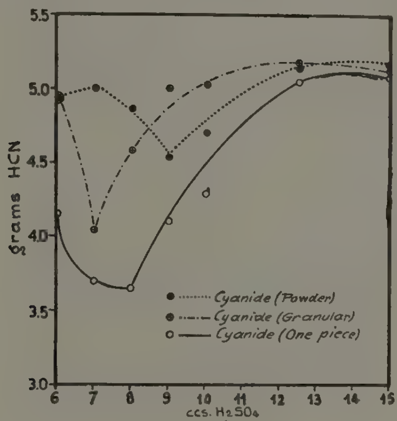
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1
10 gms NaCN (96.08 % purity) = 5.294 gms HCN
Cyanide: Granular



Graph XIII

Sulphuric Acid Strength 95.87 %

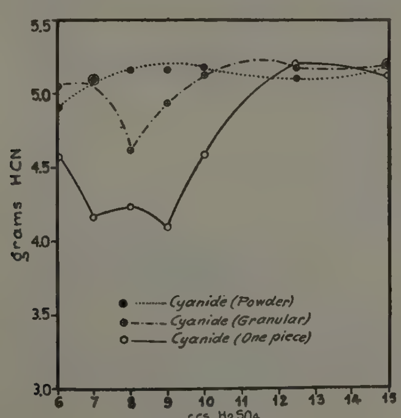
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1



Graph XIV

Sulphuric Acid Strength 95.87 %

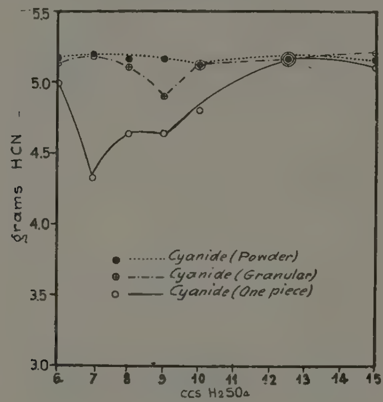
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 1.4



GRAPH XV

Sulphuric Acid Strength 95.87 %

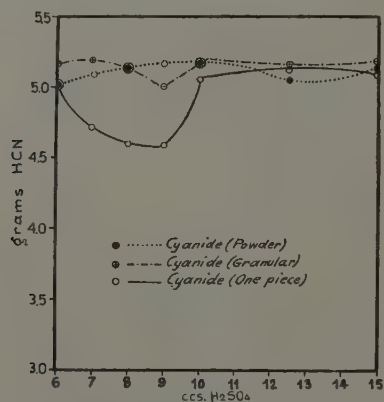
Ratio: Cyanide 1: Acid varying (0.6-1.5): Water 1.6



GRAPH XVI

Sulphuric Acid Strength 95.87 %

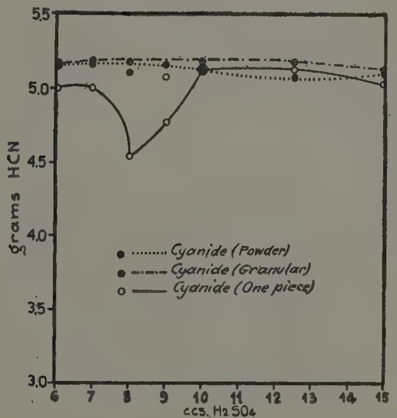
Ratio: Cyanide 1: Acid varying (0.6-1.5): Water 1.8



GRAPH XVII

Sulphuric Acid Strength 95.87 %

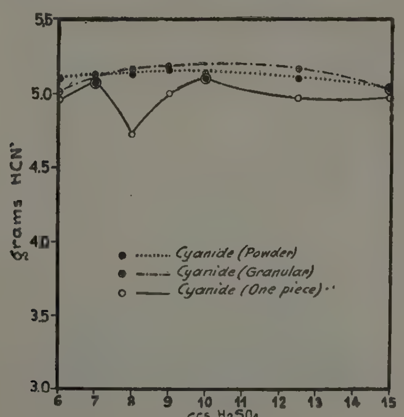
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 2



GRAPH XVIII

Sulphuric Acid Strength 95.87 %

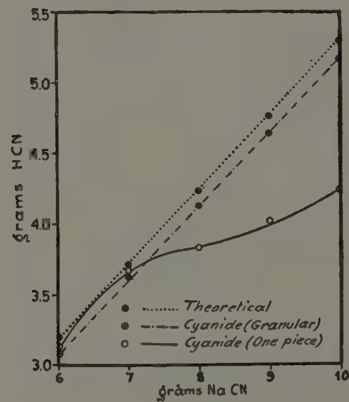
Ratio: Cyanide 1 : Acid varying (0.6 - 1.5) : Water 2.2



GRAPH XIX

Sulphuric Acid Strength 95.50 %

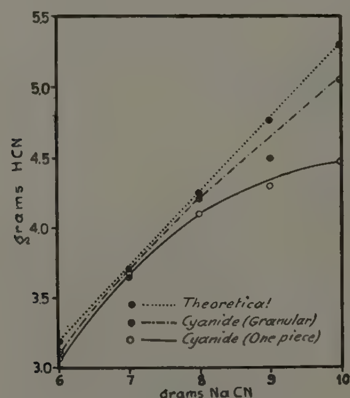
Ratio: Cyanide varying (6-10) : Acid 7 : Water 16



GRAPH XX

Sulphuric Acid Strength 95.50 %

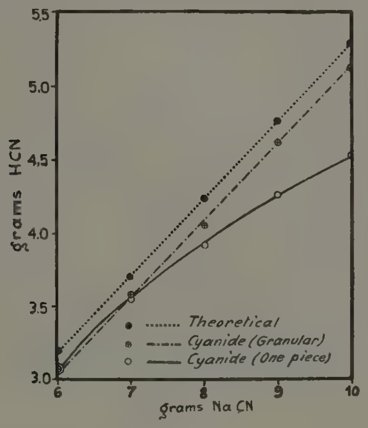
Ratio: Cyanide varying (6-10) : Acid 8 : Water 16



Graph XXI

Sulphuric Acid Strength 95.00 %

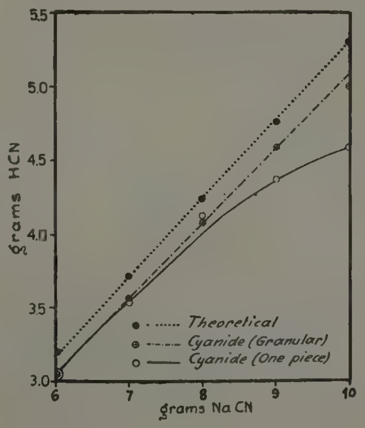
Ratio: Cyanide varying (6-10) : Acid 7 : Water 18



Graph XXII

Sulphuric Acid Strength 95.00 %

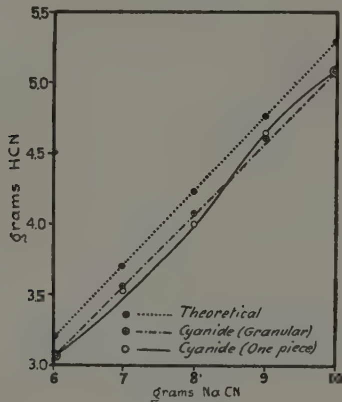
Ratio: Cyanide varying (6-10) : Acid 9 : Water 18



GRAPH XXIII

Sulphuric Acid Strength 95.00 %

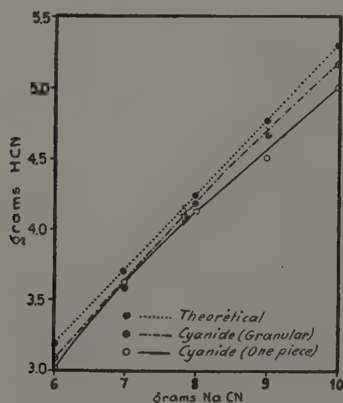
Ratio: Cyanide varying (6-10) : Acid 6 : Water 20



GRAPH XXIV

Sulphuric Acid Strength 95.87 %

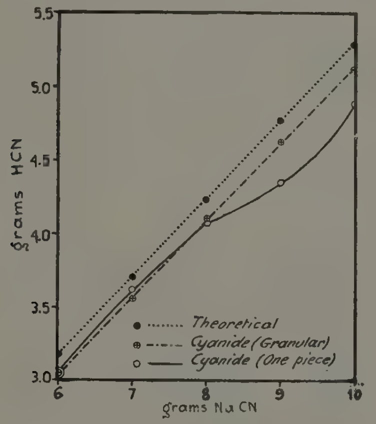
Ratio: Cyanide varying (6-10) : Acid 7 : Water 20



GRAPH XXV

Sulphuric Acid Strength 95.00 %

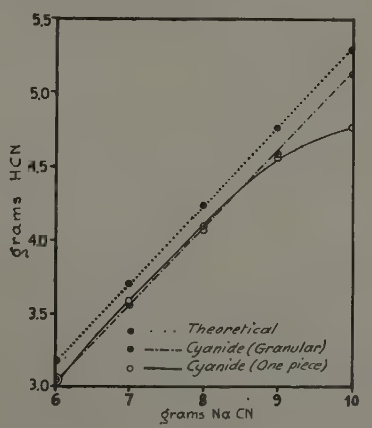
Ratio: Cyanide varying (6-10) : Acid 8 : Water 20



GRAPH XXVI

Sulphuric Acid Strength 95.00 %

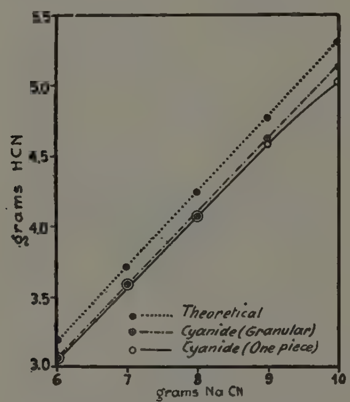
Ratio: Cyanide varying (6-10) : Acid 9 : Water 20



GRAPH XXVII

Sulphuric Acid Strength 95.00 %

Ratio: Cyanide varying (6-10): Acid 10: Water 20



TABLES I-XIV

SHOWING EFFICIENCY OF HCN GAS LIBERATED

FROM COMMERCIAL H_2SO_4 AND NaCN.

(Pot-Method Fumigation)

TABLE I

Sulphuric Acid Strength .... 85.88 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.185	4.401	4.725	4.671	4.509	4.644
0.70	4.698	4.014	4.401	4.887	4.914	4.806
0.80	4.401	5.022	4.860	4 590	4.689	4.860
0.90	3.861	4.806	4.833	4.860	4.914	4.455
1.00	3.996	4.590	4.590	4.779	4.590	4.671
1.25	4.617	4.806	5.130	5.157	5.211	5.022
1.50	5.157	5.130	5.103	5.103	5.076	5.103

TABLE II

Sulphuric Acid Strength .... 85.80 % | Reaction .... Normal
Cyanide ... Large broken pieces | Quantity of Cyanide.. 5 gms (Ratio 1)

Note: *This Table is made for 10 gms of NaCN.*

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1 60	1.80	2.00	2.20
0.60	4.104	4.158	4.320	4 374	4.347	3.564
0.70	4.320	4.752	4.779	4.320	4.536	4.509
0.80	4.185	4.779	4.536	4.293	4.320	4.779
0.90	3.726	4.455	4.779	4.698	4.806	4.536
1.00	4.158	4.617	4.536	4.806	4.725	4.644
1.25	4.428	4.617	4.752	4.941	4.860	4.914
1.50	4.779	4.860	4.752	4.752	4.806	4.725

TABLE III

Sulphuric Acid Strength .... 85.00 % | Reaction ... With little shaking
Cyanide ... Large broken pieces | Quantity of Cyanide.. 5 gms (Ratio 1)

Note: *This Table is made for 10 gms of NaCN.*

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.752	4.320	3.780	4.050	3.699	4.212
0.70	4.752	4.428	3.834	4.266	4.482	4.752
0.80	4.617	4.266	4.968	4.941	4.941	5.022
0.90	4.185	4.725	4.806	4.995	5.022	4.968
1.00	4.455	4.698	4.779	4.914	4 995	4.887
1 25	4.887	4 887	5.022	5.103	5.076	5.076
1.50	5.049	5.022	4.968	4.968	4.995	4.995

TABLE IV

Sulphuric Acid Strength .... 87.66 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.536	4.671	4.833	4.887	4.887	4.806
0.70	4.806	4.752	4.995	4.995	5.103	5.211
0.80	4.779	4.698	4.941	5.049	5.049	5.130
0.90	3.996	4.590	5.211	5.049	5.022	5.103
1.00	4.023	4.698	4.887	5.022	5.103	5.022
1.25	4.698	4.941	5.265	5.103	5.211	5.265
1.50	5.157	5.211	5.130	5.157	5.130	5.157

TABLE V

Sulphuric Acid Strength .... 87.66 % | Reaction ...... Vigorous shaking
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	5.076	4.995	5.076	4.995	4.860	4.941
0.70	5.265	5.265	5.211	5.265	5.184	5.154
0.80	5.265	5.265	5.238	5.265	5.238	5.184
0.90	4.793	5.238	5.265	5.238	5.265	5.022
1.00	4.698	5.265	5.211	5.265	5.265	5.157
1.25	4.779	5.184	5.157	5.211	5.211	5.076
1.50	5.211	4.995	5.022	5.022	5.022	4.914

TABLE VI

Sulphuric Acid Strength .... 89.47 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.698	4.455	4.644	4.617	4.887	4.914
0.70	4.509	4.644	4.590	4.887	4.941	4.860
0.80	4.320	4.671	4.590	4.698	4.779	4.644
0.90	3.807	4.320	4.428	4.671	4.833	4.860
1.00	4.050	4.806	4.779	4.860	4.968	5.103
1.25	4.725	4.914	4.995	5.130	5.184	5.157
1.50	5.157	5.103	5.103	5.184	5.157	5.022

TABLE VII

Sulphuric Acid Strength .... ·91.87 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0 60	4.185	4.509	4.644	4.752	4.725	4.860
0.70	3.728	4.401	4.644	4.644	4.833	4.995
0.80	3.591	4.131	4.698	4.509	4.941	4.968
0.90	3.834	4.347	4.941	4.806	4.806	5.049
1.00	4.185	4.374	4.833	4.806	4.833	4.941
1.25	4.401	4.860	4.860	5.130	5.049	5.076
1.50	5.022	5.130	4.995	4.968	4.941	4.968

TABLE VIII

Sulphuric Acid Strength .... 93.75 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	3.996	4.671	4.644	4.914	4.914	4.671
0.70	3.591	4.590	4.536	4.590	4.833	4.995
0.80	3.537	4.482	4.590	4.806	4.860	4.833
0.90	4.050	4.590	4.428	4.914	4.806	4 725
1.00	4.428	4.428	4.725	4.995	4.941	4.968
1.25	4.941	4.914	4.914	4.968	5.076	5.076
1.50	4.968	5.076	5.076	4.914	4.941	4.860

TABLE IX

Sulphuric Acid Strength .... 95.87 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.158	4.590	4.995	4.995	4.995	4.968
0.70	3.699	4.158	4.320	4.725	4.995	5.076
0.80	3.645	4.239	4.644	4.590	4.536	4.725
0.90	4.104	4.104	4.644	4.590	4.779	4.995
1.00	4.293	4.590	4.806	5.049	5.130	5.103
1.25	5.049	5.211	5.184	5.130	5.130	4.968
1.50	5.076	5.130	5.130	5.103	5.022	4.995

TABLE X

Sulphuric Acid Strength .... 95.00 % | Reaction .... Normal
Cyanide One piece I.C.I. selected | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	3.321	4.968	5.076	5.022	4.995	4.995
0.70	3.321	4.860	4.914	5.049	4.914	4.941
0.80	3.645	4.050	4.428	4.752	4.914	5.022
0.90	4.212	4.104	4.428	4.725	4.914	5.022
1.00	4.212	4.428	4.617	4.887	4.914	5.076
1.25	4.860	4.914	4.860	5.022	4.914	5.022
1.50	4.590	5.157	5.076	5.076	5.049	4.914

TABLE XI

Sulphuric Acid Strength .... 95.87 % | Reaction .... Normal
Syanide ....Powder cyanide | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.941	4.914	5.184	5.022	5.157	5.103
0.70	4.995	5.103	5.211	5.103	5.157	5.076
0.80	4.860	5.157	5.157	5.130	5.103	5.130
0.90	4.536	5.157	5.157	5.157	5.157	5.157
1.00	4.698	5.184	5.130	5.130	5.130	5.103
1.25	5.130	5.103	5.157	5.049	5.076	5.103
1.50	5.157	5.211	5.157	5.130	5.103	5.022

TABLE XII

Sulphuric Acid Strength .... 95.50 % | Reaction .... Normal
Cyanide .... Ganular | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.941	5.049	5.157	5.157	5.157	4.995
0.70	4.050	5.103	5.184	5.184	5.184	5.130
0.80	4.590	4.617	5.103	5.157	5.184	5.157
0.90	4.995	4.941	4.914	4.995	5.076	5.184
1.00	5.022	5.130	5.130	5.184	5.184	5.130
1.25	5.184	5.184	5.184	5.157	5.184	5.157
1.50	5.130	5.211	5.211	5.184	5.130	5.022

TABLE XIII

Sulphuric Acid Strength .... 97.25 % | Reaction .... Normal
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.239	4.725	4.644	4.671	5.022	5.022
0.70	3.537	3.888	4.833	4.887	4.806	4.887
0.80	3.780	3.969	4.212	4.536	4.779	4.941
0.90	4.320	4.266	4.482	4.644	4.860	5.022
1.00	4.455	4.482	4.671	4.941	5.022	4.968
1.25	4.914	5.103	5.022	5.022	5.022	5.049
1.50	4.941	5.103	5.130	5.076	5.076	4.968

TABLE XIV

Sulphuric Acid Strength .... 98.00 % | Reaction ... With little shaking
Cyanide .... One piece | Quantity of Cyanide 10 gms (Ratio 1)

SULPHURIC ACID RATIO	WATER RATIO					
	1.00	1.40	1.60	1.80	2.00	2.20
0.60	4.050	5.049	5.130	5.076	5.103	5.176
0.70	3.429	4.509	4.779	5.022	5.176	5.022
0.80	3.942	4.131	4.455	4.887	5.103	5.049
0.90	4.239	4.320	4.617	4.779	4.914	4.995
1.00	4.590	4.590	4.725	4.860	4.995	5.022
1.25	4.995	5.103	5.049	5.049	4.995	4.995
1.50	4.833	5.130	5.130	5.130	5.076	5.022

TABLES XV-XXIII

SHOWING SPEED OF REACTION WITH REGARD

OF DIFFERENT FORMS OF NaCN.

TABLE XV

Sulphuric Acid used = 95.50 %

Ratio : 7 Acid : 16 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.50	3.105	0
7	13.50	3.645	1
8	14.20	3.834	2
9	14.90	4.023	3
10	15.70	4.239	3
CYANIDE (GRANULAR)			
6	14.40	3.078	0
7	13.40	3.618	0
8	15.30	4.131	½
9	17.20	4.644	1
10	19.10	5.157	½

TABLE XVI

Sulphuric Acid used = 95.87 %

Ratio : 8 Acid : 16 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.70	3.064	0
7	13.60	3.672	½
8	15.20	4.104	1
9	15.90	4.293	3
10	16.60	4.482	3
CYANIDE (GRANULAR)			
6	11.50	3.105	0
7	13.50	3.645	0
8	15.60	4.212	0
9	16.60	4.482	½
10	18.80	5.049	1

Table XVII

Sulphuric Acid used = 95.00 %

Ratio : 7 Acid : 18 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO^3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.30	3.051	0
7	13.20	3.564	1/2
8	14.50	3.915	2
9	15.80	4.266	3
10	16.80	4.536	3
CYANIDE (GRANULAR)			
6	11.20	3.024	0
7	13.30	3.591	0
8	15.00	4.050	1/2
9	17.10	4.617	1/2
10	19.00	5.130	1/2

Table XVIII

Sulphuric Acid used = 95.00 %

Ratio : 9 Acid : 18 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.30	3.051	0
7	13.10	3 537	0
8	15.30	4.131	0
9	16.20	4.374	2
10	17.00	4.590	3
CYANIDE (GRANULAR)			
6	11.20	3.024	0
7	13.20	3.564	0
8	15.10	4.077	0
9	17.00	4.590	1/2
10	18.00	4.995	1

TABLE XIX

Sulphuric Acid = 95.00 % (94.95 %)

Ratio : 6 Acid : 20 Water : Cyanide varying (6-10 gms).

CYANIDE (1 PIECE)			
Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
6	11.30	3.051	0
7	13.10	3.537	1/2
8	14.80	3.996	2
9	17.20	4.644	0
10	18.80	5.076	1
CYANIDE (GRANULAR)			
6	11.30	3.051	0
7	13.20	3.564	1/2
8	15.10	4.077	1/2
9	17.10	4 617	1/2
10	18.80	5.076	1

TABLE XX

Sulphuric Acid used = 95.87 %

Ratio : 7 Acid : 20 Water : Cyanide varying (6-10 gms).

CYANIDE (1 PIECE)			
Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
6	11.10	2.997	0
7	13.40	3.618	1/2
8	15.30	4.131	2
9	16.70	4.507	3
10	18.50	4.995	3
CYANIDE (GRANULAR)			
6	11.40	3.078	0
7	13.30	3.591	0
8	15.50	4.185	1/2
9	17.30	4.671	1/2
10	19.20	5.184	1/2

TABLE XXI

Sulphuric Acid = 95.00 % (94.95 %)

Ratio : 8 Acid : 20 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.30	3.051	0
7	13.40	3.618	0
8	15.10	4.077	1/2
9	16.10	4.347	2
10	18.10	4.887	2
CYANIDE (GRANULAR)			
6	11.30	3.051	0
7	13.20	3.564	0
8	15.20	4.104	0
9	17.10	4.617	1/2
10	19.00	5.130	1/2

TABLE XXII

Sulphuric Acid = 95.00 % (94.95 %)

Ratio : 9 Acid : 20 Water : Cyanide varying (6-10 gms).

Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
CYANIDE (1 PIECE)			
6	11.20	3.024	0
7	13.30	3.591	0
8	15.10	4.077	0
9	16.90	4.563	1/2
10	17.70	4.799	2
CYANIDE (GRANULAR)			
6	11.20	3.024	0
7	13.20	3.564	0
8	15.20	4.104	0
9	17.00	4.590	0
10	19.00	5.130	1/2

TABLE XXIII

Sulphuric Acid used = 95.00 %

Ratio : 10 Acid : 20 Water : Cyanide varying (6-10 gms).

CYANIDE (1 PIECE)			
Grams of NaCN	Ccs N/10 $AgNO_3$	Grams of HCN	Comparative size of residue left
6	11.30	3.051	0
7	13.30	3.591	0
8	15.30	4.131	0
9	17.00	4.590	0
10	18.60	5.022	1
CYANIDE (GRANULAR)			
6	11.30	3.051	0
7	13.30	3.591	0
8	15.10	4.077	0
9	17.10	4.617	0
10	19.00	5.130	1/2

Séance du 20 Décembre 1938

Présidence de Monsieur le Professeur H.C. EFFLATOUN Bey,
Vice-Président

Dons à la Bibliothèque:

La Société a reçu les ouvrages mentionnés ci-dessous:

1° De Monsieur A. HUSTACHE, de Lagny (France): 14 tirés à part relatifs à ses récentes études des Curculionides.

2° De Monsieur A. GIORDANI SOIKA, de Venise: 2 separata de ses récents travaux sur les Hyménoptères, dont l'un presqu'entièrement consacré à la faune égyptienne « Diagnosi di nuovi Eumenini mediterranei », extrait du Bolletino della Società Veneziana di Storia Naturale, Vol. II, No. 1, 1938, pp. 2-13.

3° De Monsieur A. H. AL-HUSSAINI, du Caire: 2 notes, sur l'avifaune égyptienne, publiées par le donateur dans « The Ibis », Juillet 1938, pp. 541-547.

4° De Monsieur le Docteur MARCELLO LA GRECA, de Naples: un separata de son travail « La muscolatura di *Gryllotalpa gryllotalpa* L. », extrait de l'Archivio Zoologico Italiano, Vol. XXVII, 1938 (XVI), pp. 217-318.

Le Conseil remercie.

Description d'un nouveau Clavigéride du Delta égyptien

(Coleoptera)

(avec 2 Figures)

par P. de Peyerimhoff

Amphironchus, Clavigerinorum nov. gen.

Gen. Pseudofustigero Reitt. *facie similis, recedens autem nasale compresso, angustato, stria suturali antice evanida, mesosterno non carinato, segmento ventris secundo sulco profundo diviso, imprimis (characteribus duobus inter cunctos subfamiliae insolitis) parte capitis antica et antennarum articulo tertio (continuo) sexu mire diversis, sextoque ventrale segmento apud marem operculato.*

Amphironchus Alfierii, nov. spec. — Long. circa 1,25 mm. — *Corpus modice elongatum, antice attenuatum, convexiusculum, sexu dispar, lucidum, toto sordide rufum, parce aureo pilosum. Caput protractum, valde longius quam latius, granulis piligeris sparsum, genis subparallelis ad collum quadratis, fronte prolata, sexu* (vide fig. ac infra) *dissimili, foveolis duabus fundo nigris* (¹) *ornata, subtus epistomati carina verticali ad modum nasi colligata, postice sulco arcuato a vertice levigato sejuncta. Oculi fere integri, laterales, mediocres, paullo prominentes. Antennae prolatae, triarticulatae, art. 1° minuto obtecto, 2° cylindraceo transverso, 3° basi quam 2° angustiore, elongatissimo, sexu valde* (vide fig. ac infra) *diverso, summo truncato sericeo. Pronotum transversum, subtrapezoideum, convexum, extus lenites rotundatum, angulis anticis evanidis, posticis fere acutis, summo leniter constrictum et levigatum, basi strigata arcuatum, disco granulis piliferis sparsum, sulco lato superficiali levigato in fovea basali profunda desinente longitudinaliter instructum. Coleoptera ampla, pronoto ad humeros indicatos latiora, extus rotundata, versus apicem aucta, basi marginata, summo truncata haud penicillata, granulis sat longe piligeris sparsa, stria suturali postice tantum insculpta. Abdomen medio*

(¹) Ces fovéoles, fréquentes chez les *Pselaphidae* et chez certains *Staphylinidae*, n'ont aucun rapport avec des ocelles supposés. Ce sont, sur le squelette externe de la tête, les cicatrices des insertions musculaires fixant les branches dorsales du tentorium (Cf. int. al. Fenner Satterthwaite Stickney, The head-capsule of Coleoptera, *Ill. biolog. Monographs*, VII, 1923, pass. et pl. II, fig. 30 [*Fustiger*], *sn* = supratentorium).

Fig. 1. — *Amphironchus Alfierii* Peyerh., ♂ et ♀ (× 48).

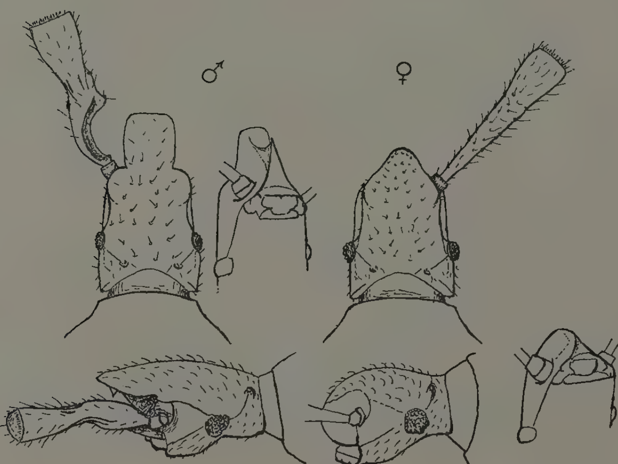


Fig. 2 — *Amphironchus Alfierii* Peyerh., ♂ et ♀ : tête vue de dessus et vue de profil; dessous de la tête, vu de biais, indiquant schématiquement la structure du nasal, aigu, angulé et dépassé en avant par le front chez le ♂, simplement étroit, courbe et rattaché au bord antérieur du front chez la ♀.

fortiter constrictum, segmento 1° dorsali antice profundissime excavato, levigato, nudo, strigis duabus obliquis antice convergentibus instructo, postice pulvinato et granulis aliquot longe piligeris ornato, segmentis 2° et 3° minutis, pilosis, infra ductis; margines primi segmenti ad medium usque crassati, intorti, extus angulati, parte supina penicillis duobus aureis crassis exornata. Subtus segmentis 2-5 ventralibus exceptis granulis longe piligeris ornatus, coxis mediis valde approximatis, intervallo angusto non carinato, coxis posticis late sejunctis, metasterno apice truncato; ventris primum segmentum sat longum, granulato piligerum, secundum maximum, strangulatum, ad latera excisum, sulco profundo transverso ad medium bipartitum, parte postica utrinque retroversa, Pedes non compressi, trochanteribus praelongis, tibiis post basin latescentibus, intus et extus sat longe fimbriatis.

Feminae *forma gravior; frons ultra antennas modice prolata, obtusa, apice granulis asperula, carina nasali incurva, angusta sed non acutissima: antennarum art. 3 sat regulatim clavatus, extus et intus symmetrice rugatus; sextum ventrale segmentum simplex.*

Maris *forma gracilior; frons antennas et nasum ultra longe protracta, constricta, applanata, levigata, apice truncata, nasi carina ad modum lamellae altae, perangustae, infra acute dentatae transfigurata; antennarum art. 3 intortus, basin intus incurvus, excavatus et medio valide dentatus, deinde constrictus, versus apicem integer obconicus; sextum ventrale segmentum operculatum, pygidium infra ductum. Pedes ut apud ♀ simplices.*

Hab. Aegyptum.

Egypte: barrage du Nil, au sud du Caire, en Septembre (coll. Alfieri et Peyerimhoff).

Abstraction faite de l'extrémité de l'abdomen, toujours un peu différente selon le sexe, les caractères masculins des *Clavigerini* affectent tout au plus les pattes. Ici, au contraire, et avec une intensité vraiment extraordinaire, ils portent sur le développement du front, la compression du nasal et la structure de l'antenne. A cet égard, le nouveau genre est unique dans toute la sous-famille.

Pour le nasal, ordinairement large et formant avec le front et l'épistome une sorte de mufle arrondi, aucune description ne mentionne sa transformation en carène, ni par conséquent le développement insolite de la fosse antennaire. Quant à l'étranglement et au sillon du deuxième sternite ventral, on les voit plus ou moins marqués déjà chez les *Articerus* Dalm. (vrais), tous propres à l'Australie et dont l'antenne d'ailleurs ne comprend que deux articles. De même l'étranglement de la marge supérieure de l'abdomen, qui débute chez les *Fustiger* Brend., devient très net chez *Pseudofustiger* Reitt. (cf. Raffray, in *Rev. d'Entom.* IX, 1890, pl. III, fig. 24), ce dernier type ayant, d'autre part, le 3e article des antennes suturé au milieu (*l.c.*, fig. 24[1]).

Bref, à suivre la clé systématique du maître des Psélaphides (²) (*Ann. Soc. entom. France*, 1904, pp. 414-454, et *Genera Insectorum*, ed. Wytsman, fasc. 64, *Pselaphidae*, 1908, pp. 417-423), fondée principalement sur la composition et la structure de l'antenne, on aboutit aux environs proches des *Fustiger* Brend. C'est entre ce genre (répandu dans les deux Amériques, en Abyssinie et à Madagascar) et le genre *Pseudofustiger* Reitt. (une seule espèce des Antilles) que l'*Amphironchus*, en somme, peut prendre place. Il n'est pas certain, du reste, que les caractères tirés de l'antenne expriment toujours les rapports naturels des *Clavigerini*, insectes dont la vie parasitaire a profondément modifié toute la structure.

Dans cette sous-famille strictement myrmécophile, — car on n'a rencontré jusqu'ici aucun Clavigéride termitophile, — les Fourmis hôtes sont loin d'être connues dans tous les cas. Il est établi cependant que les *Claviger* Preyssl. et les *Adranes* Lec. sont clients des *Lasius*, et il est curieux de voir ces deux genres, les seuls qui soient complètement aveugles, former aussi un ensemble typiquement holarctique, partagé entre l'Europe et le bassin de la Méditerranée (*Claviger*) et l'Amérique du Nord (*Adranes*). Les autres *Clavigerini*, tous bien oculés et surtout abondants dans les régions intertropicales, semblent, en majorité, attachés aux *Crematogaster*, et peut-être est-ce le cas de l'insecte décrit ici.

Amphironchus Alfierii Peyerh. est certainement l'un des éléments les plus remarquables de la faune du Delta égyptien, et je remercie Monsieur An. Alfieri de m'avoir confié la mission de le faire connaître.

(²) Ach. Raffray (1844-1923), dans une série d'admirables travaux couronnés par deux Catalogues (*Ann. Soc. ent. France* 1903 et 1904, et *Coleopterorum Catalogus*, ed. Junk, pars 27, 1911) et la Monographie du *Genera Insectorum* (1908), a magistralement fondé la connaissance des *Pselaphidae* (incl. *Clavigerini*), avant lui très fragmentaire. Son talent d'illustration était prodigieux, et il gravait lui-même ses planches sur verre, à l'aide d'instruments délicats dont il avait dirigé la construction. Grâce à lui, les silhouettes des espèces les plus remarquables, et une foule de détails compliqués, si difficiles à décrire sur des objets aussi petits, sont désormais fixés avec une précision qu'aucune diagnose n'aurait pu rendre.

Bemerkungen zu einigen Arten der Gattung *Coriomeris* Westw. und Beschreibung einer neuen Unterart

(Hemiptera-Heteroptera : Pseudophloeinae)

(mit 5 Text-Figuren)

von K. SCHMIDT, Fuerth, Bayern

Durch die Liebenswürdigkeit des Herrn Prof. Dr. H. Priesner, Cairo, wurde mir der gesamte *Coriomeris*-Bestand der Sammlung des ägyptischen Ackerbauministeriums zugeleitet, bestehend aus 77 ♂♂ und 62 ♀♀, die in den Monaten I, II, IV, V, VI, VIII, X, XI, XII der Jahre 1929 bis 1936 bei Abu Rawash, Borgash, Genefa, Ghobbet el Bous, Helwan, Kafr Hakim, Kerdasa, Magadlah, Manshiet Radwan, Mansouriah, Wadi Walla gesammelt worden waren. Bei oberflächlicher Betrachtung schienen sie zu den Arten *affinis* H.Sch., *vitticollis* Reut. und *pallidus* Reut. zu gehören. Als ich sie aber getrennt nach Geschlechtern und nach gleichen Fundorten und Fundzeiten zusammensteckte, ergab sich, dass nur die ♂♂ den Arten *affinis* H. Sch. und *vitticollis* Reut. zu gleichen schienen, während alle ♀♀ zu *pallidus* Reut. hätten gerechnet werden müssen. Auf Grund des zahlreichen Materials aus einer verhältnismässig engbegrenzten und gleichgearteten Landschaft bin ich zu der Überzeugung gekommen, dass es sich nur um eine einzige Art handeln könne und zwar um eine, die mit *affinis* H.Sch. sehr nahe verwandt ist. Die Unterschiede von dieser scheinen mir aber nicht so erheblich zu sein, um damit eine neue Art begründen zu können und darum stelle ich die mir vorliegenden ägyptischen Exemplare als neue Unterart *aegyptius* zur spec. *affinis* H.Sch. Es scheint, dass einige *Coriomeris*-Arten an den Grenzbezirken ihres Hauptverbreitungsgebietes Übergänge bilden oder dass einige Arten überhaupt nur Rassen darstellen.

Im folgenden gebe ich eine Zusammenstellung von Maszen verschiedener Körperteile der neuen Unterart und ihrer nächsten Verwandten. Zum Vergleich lagen mir vor:

1 ♂ *affinis* H.Sch. aus Tunis, Ain Draham.
1 ♀ *affinis* H.Sch. aus Spanien, Ciudad Real (det. Reuter).
1 ♂ *vitticollis* Reut. aus Tiflis, Caucasus.
1 ♀ *vitticollis* Reut. aus Kvirili, Caucasus.
1 ♀ *pallidus* Reut. aus Kleinasien, Naday 1911 (det. Horvath).

Diese und noch andere Arten stellte mir in liebenswürdiger Weise Herr Prof. Dr. L. Tóth aus der Sammlung des Budapester Nationalmuseums zur Verfügung, wofür ich ihm auch an dieser Stelle herzlich danke.

Kopf

Breite (samt Augen) zur Länge (von der Ocellenhinterrandlinie bis zur Wangenspitze, ohne Tylusdornen) :

aegyptius ssp. nov.	♂ 1:0,900 ;	♀ 1:0,864
affinis H.Sch.	♂ 1:0,900 ;	♀ 1:0,979
vitticollis Reut.	♂ 1:0,780 ;	♀ 1:0,841
pallidus Reut.	♂ —— ;	♀ 1:0,750

Der kurze kopfe des *pallidus* ♀ ist auffällig. Die Entfernung der Fühlerhöckerspitze bis zum vorderen Augenrand ist nur wenig länger als der Längsdurchmesser des Auges samt dem Augenpolster.

Fühler

Um die Abänderung der Fühlerlängen festzustellen, untersuchte ich von der ssp. *aegyptius* folgende Stücke (1 = Längenzahl des Grundgliedes) :

Kafr Hakim,	27.11.33 ;	1:0,865:0,892:1,216
Kafr Hakim,	31. 8.32 ;	1:0,833:0,861:1,083
Kafr Hakim,	29.11.36 ;	1:0,743:0 857:1,143
Abu Rawash,	9.10.32 ;	1:0,828:0,886:1,143
Abu Rawash,	6. 6.34 ;	1:0,763:0,816:1,105
Abu Rawash,	16.10.32 ;	1:0,789:0,868:1.131
Abu Rawash,	16.10.32 ;	1:0,857:0.885:1,143
Helwan,	9. 6.34 ;	1:0,857:0,914:1,200
Helwan,	9. 6.34 ;	1:0,865:0,892:1,135
Mansouriah,	6. 6.29 ;	1:0,868:0,868:1,052
Borgash,	6.12.33 ;	1:0,802:0 875:1,100
Kerdasa,	23. 8.31 ;	1:0 789:0,868:1,105
affinis H.Sch.		1:0,868:0,868:1,171
vitticollis Reut.		1:0,909:0,909:1,212
hirticornis F.		1:1,055:1,027:1,166

Aus dieser Liste geht hervor, dass die Fühlerlängen der ♂♂ innerhalb gewisser Grenzen abändern und dass die Fühler der neuen Unterart sich in ihren Verhältnissen am meisten denen von *affinis* H.Sch. nähern. Das 3. Fühlerglied der ssp. *aegyptius* ist mit einer einzigen Ausnahme stets etwas länger als das 2. Nachdem ich aber nur 1 ♂ *affinis* messen konnte, kann ich nicht angeben, ob dieses Merkmal nicht auch auf *affinis* H.Sch. zutrifft. Am stärksten ändert das letzte Fühlerglied ab, das bekanntlich bei den meisten

♂♂ *Coriomeris*-Arten (bei allen?) stets länger ist als bei den ♀♀. Nur bei *hirticornis* F. ist das 2. und das 3. Fühlerglied länger als das 1.

♀♀

aegyptius ssp.nov.:

Kafr Hakim,	27.11.33;	1:0,857:0,952:0,833
Kafr Hakim,	27.12.33;	1:0,875:0,950:0,775
Kafr Hakim,	29.11.36;	1:0,785:0,833:0,714
Abu Rawash,	6. 6.34;	1:0,900:1,000:0,850
Abu Rawash,	16.10.32;	1:0,918:1,000:0,891
Abu Rawash,	16.10.32;	1:0,880:0,928:0,833
Helwan,	9. 6.34;	1:0,921:1,000:0,842
Mansouriah,	11. 8.35;	1:0,860:0,907:0,848
Borgash,	6.12.33;	1:0,875:0,975:0,825
Borgash,	6.12.33;	1:0,923:0,961:0,846
Borgash,	6.12.33;	1:0,850:0,950:0,896
affinis H.Sch.		1:0,973:0,973:0,896
vitticollis Reut.		1:0,925:0,912:0,900
pallidus Reut.		1:0,891:0,865:fehlt
hirticornis F.		1:1,125:1,100:0,807

Auch bei den ♀♀ von *aegyptius* ssp. nov. ist das 3. Fühlerglied länger als das 2., während bei den mir vorliegenden ♀♀ *affinis* und *vitticollis* beide gleich oder nahezu gleich sind. Das 1. Fühlerglied ist bei *affinis*, *affinis aegyptius*, *vitticollis* und *pallidus* länger als die übrigen Glieder; hingegen ist bei *hirticornis* ♀ Fühlerglied 2 und 3 länger als 1, nur das letzte Fühlerglied ist kürzer. Die Fühlerlängenverhältnisse der ägyptischen Unterart von *affinis* H.Sch. lassen sich schlecht mit denen der verwandten Arten vergleichen.

Hier muss ich auch den *Coriomeris bergevini* Popp. erwähnen, der zufolge Lindberg (8) nach einem einzigen ♀ aus Algier beschrieben wurde und dem, wie aus der Beschreibung hervorgeht, das letzte Fühlerglied fehlte. Zu dieser Art können die ägyptischen Tiere aber deswegen nicht gehören, weil bei *bergevini* Popp. "das 2. Fühlerglied nur etwa 1/5 länger als das 1. ist". Unter den mir vorliegenden 62 ♀♀ der ägyptischen *Coriomeris* ist nicht ein einziges Exemplar dabei, das das 2. Fühlerglied länger hat als das 1.

Das Fühlergrundglied ist bei *vitticollis* ♂ 0,8 mal so lang wie der Kopf mit den Augen breit ist, bei *affinis* ♂ und *affinis aegyptius* ♂ 0,92 mal, bei *pallidus* ♀ 0,83, bei *vitticollis* ♀ 0,88, bei *affinis* ♀ 0,95, bei *affinis aegyptius* ♀ 0,93 mal.

Pronotum

Die Verhältnisse von mittlerer Länge, vorderer und hinterer Breite des Pronotums sind nach meinen Beobachtungen ziemlich schwankend. Trotzdem seien die entsprechenden Teilstrichzahlen des Okularmikrometers angeführt, wobei die erste Zahl die Mittellänge des Pronotums angibt, die zweite die vordere Breite, die letzte Zahl die Entfernung vom Grund des einen Schulterdons zum Grund des andern.

pallidus,	♀ 44 ; 33 ; 70 ;	♂ — — —
vitticollis,	♀ 43 ; 35 ; 70 ;	♂ 45 ; 30 ; 70
affinis,	♀ 40 ; 30 ; 67 ;	♂ 45 ; 31 ; 75
affinis aegyptius,	♀ 45 ; 33 ; 75 ;	♂ 42 ; 32 ; 77

Die von aussen sichtbaren Teile der Genitalsegmente und die Genitalarmatur zeigen bei den ♂♂ und ♀♀ der untersuchten Arten keine Unterschiede. Die Genitalgriffel sind so einfach und einförmig gebaut, dass geringe Formverschiedenheiten innerhalb der Abänderungsmöglichkeiten der gleichen Art liegen können oder möglicherweise auch durch die Lage des Griffels im Präparat verursacht sind. Die Griffel haben die Form einer kurzen, etwas plattgedrückten Keule, die innen zwei stumpfe braungefärbte Zähne aufweist; beide Griffel sind gleichförmig ausgebildet, sind innen kurz fein behaart, aussen auf der Rückseite tragen sie etwas stärkere Borsten. Der Penis sieht aus wie ein mehrfach geringeltes Drahtstück mit ± geradem Ende. (Die Behaarung ist der Einfachheit halber nur bei einem Griffel eingezeichnet).

Der hauptsächlichste Grund, warum ich die ägyptischen *Coriomeris*-Exemplare als Unterart von *affinis* H.Sch. ansehe, ist der, dass sie hinsichtlich der Behaarung der Fühler, des Körpers und der Beine, hinsichtlich der Bestachelung auf Kopf und Pronotum, der Länge der Stachelborsten an den Pronotumseiten, des Verlaufes der Pronotumseiten und in bezug auf die spitz ausgezogenen Hinterecken der Hinterleibsringe mit *affinis* H.Sch. übereinstimmen. Die Hinterecken der Connexivumabschnitte sind sowohl bei *affinis* H.Sch. wie bei ssp. *aegyptius* länger als bei den anderen erwähnten Arten und nach rückwärts und nach aussen gerichtet, so dass sie deutlich ausserhalb der allgemeinen Umrisslinie des Hinterleibs liegen.

Ausser durch die schon erwähnten Verhältnisse der Fühlerlängen unterscheidet sich die Unterart von der Stammform noch durch folgende Merkmale, wobei ich nochmals bemerken muss, dass mir nur 1 ♂ und 1 ♀ von *affinis* H.Sch. zum Vergleich vorlag. Die Fühlerglieder 2 und 3 sind bei den ♀♀ der subspec. auf der Ober- und Unterkante etwas dichter kurzhaarig; infolgedessen erscheinen die Glieder platter und, seitlich gesehen, breiter, so breit wie das letzte Fühlerglied. Hingegen ist bei *affinis* das letzte Fühlerglied, auch seitlich gesehen, dicker als das vorhergehende. Das ♀ von *affinis* ist schlanker.

affinis H.Sch. : ♂, 9 mm. lang, 3 mm. breit ; ♀, 8 ½ mm. und 3 ½ mm.

affinis aegyptius ssp. nov. : ♂, 9-9½ mm. lang, 3¼-3½ mm. breit ; ♀, 9½-9¾ mm. und 4 mm.

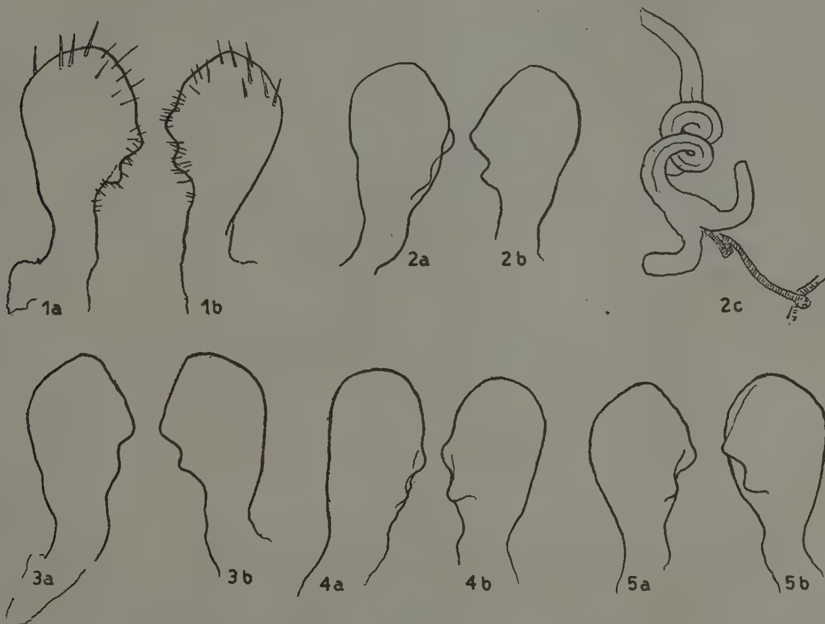


Fig. 1. — *Coriomeris affinis aegyptius* ssp. nov. (Mansouriah, 6.6.1929) : a. linker, b. rechter Griffel.

Fig. 2. — *Coriomeris affinis aegyptius* ssp. nov. (Kafr Hakim, 29.11.1936) : a. linker, b. rechter Griffel, c. Penis.

Fig. 3. — *Coriomeris affinis aegyptius* ssp. nov. (Abu Rawash, 16.10.1932) : a. linker, b. rechter Griffel.

Fig. 4. — *Coriomeris vitticollis* Reuter (Caucasus: Tiflis, 3.6.93) : a. linker, b. rechter Griffel.

Fig. 5. — *Coriomeris affinis* Reuter (Hispania : Ciudad Real) : a. linker, b. rechter Griffel.

Der grösste Teil der ♂♂ *aegyptius* ist rotbräunlich, bald mit überwiegend rötlicher, bald mit mehr bräunlicher Tönung. Der übrige Teil ist grau sandgelb. Die ♀♀ sind sandgelb, nur 3-4 Stücke sind etwas rötlich bis rotbräunlich gefärbt. Die ersten beiden Hinterleibssegmente sind auf dem Rücken vollständig schwarz, die nächstfolgenden sind in der Mitte hell, die 5. Rückenschiene ist nur noch in den Grundwinkeln dunkel. In der Mitte des Rückens läuft eine ± bräunliche, schmale Längslinie, die auf dem letzten Segment etwas verbreitert und dunkler ist. Bei mehreren Stücken sind ausser

den Seitendornen auch die Seitenrandlinien des Pronotums scharf abgegrenzt weiss gefärbt.

Einige ♂♂ der ssp. *aegyptius* zeigen auf dem Pronotum 5 dunkle Längsstreifen, ähnlich wie *vitticollis* Reut.; doch sind ihre Pronotumseiten mehr gebuchtet, die Zähne des Connexivums sind länger spitzausgezogen, die Grundfarbe ist nicht so gleichförmig braun. Bei *vitticollis* Reut. sind die Punktgruben auf den Flügeldecken dunkelbraun bis schwarz ausgefüllt; bei *aegyptius* ssp. nov. sind sie ± gleichfarbig mit den Zwischenräumen zwischen den Punkten, so dass die Flügeldecken auch der dunklen Spielarten heller sind als bei dem mir zur Verfügung stehendem ♂ von *vitticollis* Reut.

Von *pallidus* unterscheidet sich die neue Unterart *aegyptius* durch den längeren Kopf. Reuter (2) teilt in einem späteren Zusatz zu der Beschreibung seines *pallidus* mit, dass die Connexivumspitzen so sind wie bei *affinis*. Bei dem Stück aus dem Budapester Museum sind sie nicht ganz so lang und spitz wie bei der ägyptischen Unterart.

Exemplare der *affinis aegyptius* ssp. nov. befinden sich in der Sammlung Min. Agric. (Egypt) und in meiner Sammlung.

Herrn Prof. Dr. H. Priesner bin ich sehr dankbar dafür, dass er mir durch die Zuleitung des reichen Materials Gelegenheit gab, mich mit einigen *Coriomeris*-Arten zu befassen.

LITERATUR

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The ideal Spray Emulsion for the Control of Scale Insects on Citrus in Egypt

(with 23 Tables)

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This question was raised few months ago when one of the commercial firms in Egypt started to induce land-owners to spray their citrus trees by the "Tank Spray" method. This simply counts in mixing plain white oil, blood albumen and water in a powerful spraying machine, using 45 grams of albumen for every 100 litres, and $1\frac{1}{2}$-2 litres of oil. The blood albumen serving the purpose of a spreader. With the powerful stirring device the oil is broken up into small particles before being set free.

Before going into details, a short out-line on the history of oils as insecticides is given.

Oils were first used in free state in 1787 against plant lice (Goeze: Geschichte einiger schädlichen Insecten, Leipzig, 1789, p. 166). In 1865 paraffin oil and kerosene were first recommended against scale insects on oranges and other trees (Gardener's Monthly, December 1865, p. 364). The oil was poured into a saucer and applied by a feather.

In 1866 paraffin was recommended for destroying all insect life, but owing to foliage injury caused from the use of plain oil it was substituted by vegetable oils, being less harmful to the plants (Gardener's Monthly, June 1866, p. 176, and July 1866, p. 208).

Later paraffin oil was applied as a mixture with water (1 part oil + 25 parts water) and a fairly uniform mixture was produced by violent syringing (Lodeman: The Spraying of Plants, 1902, p. 79). Another method for diluting the oil was by spraying the oil and water simultaneously at the tree through separate jets.

Then oils were applied in an emulsified state to make them into a proper emulsion, using soap as an emulsifying agent. Others used soapy water and cresylic acid (Gardener's Monthly, January 1868, p. 11).

Cruickshank (Gardener's Monthly, February 1870, p. 45), controlled current worm by using kerosene emulsified with whale oil-soap. He increased the kerosene until it killed the worm without causing damage to the foliage.

Cook in 1887-1888 (Mich. Agric. Exp. Station, Bull. No. 58, 1890) was the first to recommend the kerosene soap emulsion for the control of sucking insects.

Tar-oils were similarly recommended by Robbens in 1889 aganist eggs. Sajo, found anthracine oil to be efficient as an ovicide (Zeitschrift Pflanzenkrankh, 1894, 5, p. 4). Later the anthracine oils were emulsified and used as dormant sprays by Del Guercio, *ibid.* 1894, 4, p. 160).

A lot of work was later carried out on the development of spraying machinery and type of emulsions and also by introducing various new emulsifiers.

In 1919, when too many trees were injured from the use of oil spraying Bedford and Pickering (Science and Fruit-growing, 1919, p. 152) found that it is almost necessary to dilute oils with water in a proper emulsion by means of an emulsifying agent.

Since then the use of oil emulsions on citrus and other plants for the control of sucking insects have stepped forward and so many research workers took interest in this problem.

Power sprayers were developed in the years 1900-1910 and this has lead to marked improvements in agitating equipment and contributed materially to the stimulation of mechanical mixture sprays specially in California. This type of spray is the same as the present tank-mixture, but in the latter, mixing was affected entirely in the tank and no attempt was made to produce an emulsion. The term tank-mixture was nominated by Mertz of Ontario in 1928 and gradually came into its general use.

Smith in 1926-1931 was the man who pushed forward the use of tank-mixture after his nice piece of work which was published in 1931 and 1932 (Journal Econ. Entom., 24, No. 5, October 1931, p. 985, and Calif. Agric. Exp. Station, Bull. No. 527, 1932).

Smith's recommendations spread out through all America and it developed enormously owing to its low cost, its ease of application, and its efficiency against scale insects.

The oil emulsion which we mean in this article is that type of emulsion in which the oil particles are divided and surrounded by the water. The oil is called the dispersed phase and the water the continuous phase, and this type is called oil-in-water emulsion.

Oil emulsions are divided into three types:

1. Mechanical dispersed oils,
2. Emulsified oils,
3. Miscible oils (soluble oils, or emulsive oils).

The first type is made by simply breaking the oil into small droplets, by beating the oil and water with powerful beaters. The moment the stirring is stopped the oil will start to separate due to the coagulation of the oil particles and will float on the top. When such a mixture of oil and water is applied to a tree the oil will separate from the water directly after application.

Sometimes a spreader is used to help the spreading of the oil particles on the sprayed surfaces, and instead of coagulating on a small area the oil particles will be spread on a larger area.

In the emulsified type another phase is introduced to disconnect the oil droplets in the emulsion and make it difficult for them to coagulate. The power of holding back the oil particles from coagulating depends on the kind and quantity of the emulsifier. Emulsified oils are either permanent or semi-permanent. The former will keep in the emulsified condition after dilution with water for a longer time than the latter which separates after a certain period according to the quantity of emulsifier used and to the method of emulsification. The size of the oil particles is also correlated with the quantity of emulsifier used.

The miscible oils are defined as clear solutions of the emulsifier in the spraying oil, the actual emulsion being obtained by stirring water into this solution.

The mechanical emulsions contain the largest size oil particles; the quick breaking emulsions or semi-permanent contain smaller size droplets and the permanent emulsions contain still smaller droplets. The smallest size droplets are present in the miscible oils (size $\frac{1}{2}$ μ).

The quantity of oil deposit is the most important factor for the safety of oils on plants, and for the efficiency of oil emulsions against insects.

The larger the size of oil particles in the emulsion the less safe to the plant and the more efficient against insects. The size of oil globules is governed by the quantity of emulsifier used and to some extent by the method of emulsification. If the emulsifier is increased the size of the oil globules in the emulsion is decreased, and when sprayed they spread and join into a thin film. Emulsions of oil and water only are supposed to be the most efficient insecticides and are also very unsafe to plants; while permanent emulsions which produce a continuous thin film on leaves are the safest to the plant and are supposed to be the least effective against insects. The last point on the efficiency of oils and its relation with the size of oil particles is proved by Beran and others to be the contrary and will be discussed later.

The quantity of spray given to the tree also governs the quantity of oil

deposit. The more the quantity of spray given the more the quantity of oil held by the tree.

The oil viscosity and distillation range are factors which also govern the efficiency of oils against insects and their effect on trees. The heavier the oil the longer it remains on the leaves in contact with the insects. This will lead to a better kill but it will also help the oil to penetrate into the plant tissue and may cause damage to the trees.

Heavy oils are avoided nowadays except in winter washes, and only light, light-medium, and medium oils are used in oil emulsions for citrus; and these are more volatile than the heavy oils.

A survey of the literature will help the reader to collect more information and will enable him to decide on the right kind of oil emulsion, and he will not be mislead by the propaganda made by people dealing in proprietory oil sprays.

Swingle (U.S. Dept. Expt. Agric., June 1931) said: "on comparing quick breaking emulsions versus permanent emulsions, that the first emulsions used were mechanical and these often injured the trees".

Dé Ong, Knight, and Chaberlin (Hilgardia, 2, p. 651, 1927) recommended the use of a quick breaking emulsion with casein-lime emulsifier. They were able to show that more oil was retained by trees, when sprayed with this type of emulsion than with the more stable emulsions ordinarily used. An unstable or quick breaking emulsion differs from the more stable types in that less emulsifier is used, the oil droplets are much larger, and oil separates from the emulsion much more readily. The emulsion theoretically breaks and frees the oil immediately upon being applied to trees.

Griffin, Richardson, and Burdette (Journal Agric. Res., 34, 1927, p. 727), concluded that the size of oil droplets in an emulsion influenced toxicity to Aphids; those with the larger size droplets being more toxic. They found that more oil was retained by plants when oil droplets were larger than when they were small.

English (Nat. Hist. Survey, Bull. 17.5.1928, p. 31), also claimed that a quick breaking emulsion was more toxic and that large size droplets are an indication of an unstable emulsion and small droplets of stable emulsion.

A quick breaking type of emulsion where the oil droplets had an average size of 15 μ was somewhat more effective than the much more stable red oil emulsion. When agitation was not perfect, trees sprayed with quick breaking emulsions while the tank was full received a too dilute spray, whereas those sprayed when the tank was nearly empty received much oil.

Ebeling (Journ. Econ. Entom. XXV, 1932, p. 1007) working on Tank-mixtures concluded that the injury to the tree as evidenced by the leaf drop, was proportional to the heaviness of the oil and the percentage amount used in the spray, and was inversely proportional to the sulphonation of the oil and the amount of spreader used in the spray.

Voglum (Citrograph, August 1934), claimed that soluble oils and emulsions appear to penetrate plants less than tank-mixture and to give better Spider control. Emulsions have shown less naval rot than the tank-mixture.

Knight (H.) and Jones (Citrograph, May 1934), concluded that the insecticidal efficiency of highly refined white oils used for the control of scale insects of citrus depends on the following:

1. The character of the oil film deposit (i.e. whether continuous or discontinuous, or in other words, whether or not the oil film is uniform all over the surface sprayed or whether it is laid down unevenly, thus giving a spotted coverage).

2. The initial of the oil deposit, or the amount of oil deposit per unit area.

Heavy oils give a good kill for their slow evaporation, but penetrate into the plant and cause injury for their long stay. Light oils evaporate quickly and do not cause injury, but kill is low.

It is obvious, other things being equal, that the spreading quality of the oil have been greatly inhanced, thus giving better coverage and spreading, and laying down uniform and continuous oil film, while the actual amount of oil deposit is less per unit area. In addition by regulating the oil deposit, the rate of evaporation and absorption can be controlled. The persistance of heavy oils which has been known in the past is maintained and because of the penetration control, the thinner films of these heavy oils give as much efficiency or more as they have found than emulsions and tank-mixture oils; at the same time eliminating injury which might be attributed to oil absorption by the tree.

Knight and Cleveland (Journal Economic Entom. 27, No. 1, February 1934, p. 269) reported that no case of injury has been reported in fact due to the very light oil deposit (less than half that of tank mixture), these soluble oils appear to be less injurious than tank-mixtures and mechanical mixtures.

Cressman, A.W. (Journal Agric. Res., 49, July 1934) reported that by chemical measurements of the oil retained on the foliage after it has been sprayed showed a quantitative relationship of insecticidal efficiency and the amount of oil deposited per unit area of plant surface. The efficiency varied directly with the oil dosage. Oil deposit and insecticidal efficiency were found to vary inversely with the concentration of soap emulsifier in the aquous phase of the emulsions, but to vary directly with the concentration of the oil in the emulsion. The quantity of oil deposited by sprays can be increased, within limits by using less emulsifier or by increasing the oil concentration.

Woodman (Tech. Aspects of Emulsions, 1935, p. 74) said: "it would thus appear that if quick breaking emulsions with large size globules are

more efficient insecticides and ovicides than the more stable and closer-grained emulsions, then (providing the risk of damage to the tree can be reduced to negligible proportions) the most efficient method of applying the oil should be as a mixture obtained by violent agitation with water in the absence of an emulsifier.

A logical train of reasoning thus leads back to methods such as were first used and it would be strange indeed where the cycle of research to box the compass and to lead back finally to the starting point".

Smith, R. (Journal Economic Ent., 24, 1931, p. 985) reported that the size of the dispersed oil droplets and the stability of a spray emulsion, are also said to govern the amount of oil retained by foliage, the emulsifier used not having any very marked effect.

Spuler, Overly and Green (Wash. Agric. Expt. Station, Bull. 247, 1931) reported that quick breaking emulsions deposit more oil and cause correspondingly greater injury to plants.

Smith (California Agric. Expt. Stat., Bull. No. 527, 1932) recommended the use of blood albumen as the emulsifier, and pointed out that the amount of oil deposited on sprayed leaves, as judged by the magnitude of the leaf-fall resulting, decreased with increasing proportions of blood albumen.

Ben-Amotz and Hoskins (Journal Econ. Ent., 30.6.1938, p. 879) reported that all emulsions containing the soap sodium oleate deposit less oil than the mechanical mixture of oil and water. These different behaviors are explained on the basis that deposit is favoured by an increase in wetting power until the latter is so great that much of the surface is continually covered during the application. Emulsifying power always decreases deposit. Oil deposit increases in tank-mixture as the spreader decreases.

Before going on, we feel it is necessary to summarise the results of the above in few lines.

1. All workers concluded that the safety of the plant is governed by the quantity of oil deposit, and the latter varies directly with the size of oil globules.

This oil deposit and the size of oil globules are controlled by the quantity of emulsifier and the method of emulsification.

Emulsions of the permanent type deposit small quantity of oil in the form of very small size oil globules producing a film on the leaves, while quick breaking emulsions deposit bigger quantity of oil in the form of large size oil globules.

The rate of evaporation per unit area of the sprayed leaf will be much greater in the first than in the second type of emulsion. This will cause local effect on the part of plant on which the oil is accumulated in a concentrated form, and will help the absorption and penetration of oil into plant tissue.

The unsaturated part of the oil will be gradually oxidised into asphaltogenic acid and cause a rapid scorching and penetration (Tucker: Indust. and Eng. Chem., 28, April 1936).

It is also made clear that the tank-mixture method of spraying is absolutely unsafe to plants owing to the above-mentioned reasons. This is also apart from mechanical faults which will happen in the machine during spraying and in the stirring device, and mistakes by the workmen which should be expected at any time in Egypt due to unexperienced hand-labour.

2. The efficiency of large size oil globules as insecticides and its superiority to small size oil globules.

This is found to be true on condition that all parts of the tree are wetted with spray or a higher percentage of oil in the spray is used. On the other hand, this will always lead to a higher oil deposit.

With the permanent emulsions, oils are spread in a sort of thin film. There is always more security for wetting the leaves with smaller quantity of oil deposited. Safety to plants in the tank-mixture will be always in doubt.

Hensill and Hoskins (Journal Econ. Entom. No. 6, December 1935, p. 942) have concluded that the wetting of plants and animal surfaces by using many different materials to facilitate the wetting with oil-sprays has caused great stress to be laid upon the importance of forming a continuous film of spray liuqid upon the surface during spraying. The effect of formation of a film is to stop the increase in the amount of insecticide deposited upon the surface, as the spray liquid falls upon it.

Beran (Anz. f. Schaedlingskünde, XII, 2, 3, 1936) working on the relation between the size of oil particles of carbolineum emulsions and its insecticidal efficiency against *Epidiaspis leperei* and *Lecanium corni*, have confirmed Hensill's and Hoskin's ideas, that the smaller the size of oil globules, the better the efficiency as insecticide.

Knight and Jones (Citrograph, May 1934) also believe in the efficiency of an emulsion which will deposit a thin continuous film than in tank-mixture.

The margin of safety to the plant in tank-mixture spraying and in quick breaking emulsions is very narrow, but in permanent emulsions, it is safe enough to produce good kill without leaving bad effect on the plant. This was observed here in Egypt for several years.

The technique of spraying developed so such in America that experienced men, after consideration of all physical, soil, and climatic conditions surrounding a particular tree, can tell what quantity of oil is necessary to give good kill without causing any damage to this tree. It may be safe there to handle a semi-permanent emulsion by the experienced men who are not allowed to carry out spraying before they pass a practical examina-

tion and obtain a licence to work under the supervision of the Government Officers. They are always employed by the commercial firms who are financially responsible for the result of their faults, and for this reason they chose reliable men to carry out spraying. In this case they can insure to a certain extent the safety of the plant.

In Egypt or may be in Palestine where such legislation does not exist at present, it is always dangerous to use any method that has the slightest doubt.

Taking all this into consideration when starting to work on oil emulsions in Egypt we have decided to take the safest route and to make only permanent emulsion with a high power of spreading and avoiding the use of heavy oils.

The following was stated in a report from U.S. of America: "During 1937 it appears that about 65 % of the oil used on Citrus in Southern California was of the so-called emulsive type, that is the emulsifer used, an organic compound is dissolved or suspended in the oil which when added to the spray tank forms an emulsion. About 34 % of the volume applied was in the form of mayonnaise paste emulsion or flowable emulsions. Apparently about 1 % was applied according to the tank-mixture method".

It is very interesting for the reader to know that even the well experienced people of America have gone back to permanent emulsions with the smallest size oil particles and discarded the use of sprays with large size oil particles.

The Problem of Scale Insects Control in Egypt

It is known that Egypt is a favourable breeding place for scale insects. The Black Scale (*Chrysomphalus ficus* Ril.) is one of the pests of Lower Egypt, whhile the Red Scale (*Chrysomphalus aurantii*) is spreading in either Lower and Upper Egypt. Mealy-bugs and other scales became dangerous in one or the other. The Cottony Cushion Scale and *Mytilaspis* are also spread over some localities. *Asterolecanium* and *Lecanium* on figs and pears and others are developing as well.

All varieties of citrus are the main host for most of the scale insects as well as many other ornamental plants which occur everywhere in the country.

The Black Scale does most of the damage to Citrus and Mango plantations in Lower Egypt. The figures below will give the reader some information on the number of citrus and mangoes which are to be treated against Black Scale and Red Scale only.

The citrus plantations have increased enormously, and for some years ago the Ministry of Agriculture could only fumigate part of the infested area. Some trees could only be treated once every two or three years. As a result of this the scales were given a chance to propagate and instead of treating

a lightly infested tree, a heavily infested is to be treated. If we suppose that an average size citrus tree which contains 1.000.000 leaves and 200 fruits is to be fumigated, and if we suppose that 20 scales are present on half the leaves and a 100 scales on every orange, this will make a number of 10.000.000 of scales on leaves and 20.000 scales on fruits. Let us suppose still that the fumigation is done perfectly well and no other factors are interfering and a kill of 99 $\frac{1}{2}$ % is obtained, the living insects left on this tree will be 100 scales on the fruits and 5.000 scales on the leaves. Let us still suppose that 50 % of the living scales will naturally die. The remaining are enough to start a heavy infestation. This is apart from the insects present on the many host-plants which are not treated.

A good grove with few insects present on some plants will become heavily infested within one or two years. If this grove was not treated early, the scales will seriously damage the trees. Control measures are more profitable with light infestation. Treating once a year will often not take it back to the light infestation stage.

The only way out of this difficulty is to treat such heavily infested trees more than once in one season. The first treatment will reduce the heavy infestation to the medium or light, and the second treatment can suppress the scale.

Fumigation gangs are kept busy in the condensed areas and if they have to go round for scattered trees, they need twice as much the power suggested for condensed areas. Even then many factors, especially weather conditions, will never help one to predict the number of trees to be treated every year.

Still the number of brigades present or even three times as much cannot treat all the infested trees in this country. The Government expenses and losses will rise enormously and the supervision of the work become difficult. There is no way out of supplementing fumigation with oil sprays.

The expenses are less than half of those of fumigation, the supervision can be more easily carried out during the day time, than at night. It is a handy method to carry even at any time of the year for very few trees, without any loss. The owner can do it himself if the attack starts on few trees. Spraying is the only means for treating scales on host-plants (hedges and thorny-plants). The following will show the number of citrus and mango trees supposed to be treated against Red-Spider or Scale insects:

NUMBER OF CITRUS TREES	NUMBER OF MANGO TREES	NUMBER OF FIG TREES	NUMBER OF GUAVA TREES	NUMBER OF OLIVE TREES
8.843.355	241.005	6.035.389	526.566	115.486

The number of trees fumigated in 1936 was approximately 4 millions. Few questions must be answered first before we go into detail.

1. Does spraying cause more damage to citrus trees than fumigation?

2. Does spraying give a good kill to scale insects?

3. Is it costly?

In answering the first question it is important to know the type of damage caused to the trees by spraying with oil emulsions and by fumigation with hydrocyanic acid gas.

If the oil stays a long time on the leaf it is said to creep through the stomata into the tissues and is stored as a foreign body inside the plant tissues. By additive accumulation in a small branch, this part of the plant is cut away from food circulation and dries out. Let us suppose that this hypothesis is true. This can be easily avoided by the following:

1. Using permanent emulsions to avoid high oil deposit and to spread the quantity of oil as a film over a large area and the rate of evaporation per unit area will thus be high.

2. To avoid spraying at high temperature and low humidities or during khamasin winds.

3. To avoid the use of heavy oils.

4. Trees should be watered a short time before the spraying as this adds to the safety of the plant. I beileve the watering will raise the cell-sap pressure and this may produce a repellent action to the oil absorption.

5. The presence of unsaturated hydro-carbons in the oil in contact with direct sun-rays and in presence of air, always leads to the oxidation of the unsaturates to asphaltogenic acids.

It is reported by Tucker (Indust. and Eng. Chem., 28, April 1936) that the petroleum oils enter the leaf through the stomata when these organs are open under the influence of light. The disturbance of oils lies within the leaf rather than on the surface. Unsaturated hydro-carbons are oxidised with the assistance of intense light into asphaltogenic acid and cause the bad effect on the plant. Our experience with such compounds is that the absorption starts from the leaf lamina, but soon the plant will form a cork tissue between the lamina and stalk. This line of separation lies at the weak point between the leaf-lamina and the wings. Leaves will fall down at this point leaving the wings behind, but the latter soon drop afterwards. The use of oils of low unsaturated compounds is always found safe to plants. The high oil deposit on bearing citrus trees during the colouring season (November and December) retards the colouration of oranges and lemons especially when using heavy oils.

With our fair weather conditions, where the rise of temperature is in most cases accompanied by rise in humidity, one can carry out spraying with oils quite safely by giving as little oil as possible in the form of a stable

emulsion, avoiding the work in abnormal weather conditions, and avoiding the use of heavy oils or oils with high unsaturates.

On the other hand there are others who believe that oils are more favourable to plant growth.

Ross (62nd Annual Report of Entom. Society, March 1933) claimed that annual application of 3% oil sprays during 6-8 consecutive years, has caused no injury to healthy pear trees and has not reduced the yield; the 10% spray slightly retarded the leaf-bud development; the 20% spray cause no injury until the 3rd year when the leaf-bud development was greatly delayed and many buds were killed.

Ginsburg (Jour. Econ. Entom., 32, 1929, p. 36) reported that the leaves of apple trees sprayed during July and August with an emulsion of a refined lubricating oil contained more chlorophyll, than the leaves of unsprayed control trees.

Volk (United States Patents, June 1933) claimed that spraying citrus fruit-trees with an emulsion of a mixture of a purified, viscus, non-volatile oil, such as Nujol and a highly penetrating mineral oil such as Kerosene. an alkaline soap, being the emulsifier stimulated or rejuvenated the plants.

Molz (Centralblat f. Bakt., 30, 1911, p. 181) and later Bitherbridge and Dillon Weston (Journal Min. Agric., 33, Great Britain, 1926, p. 332) demonstrated that one result of using tar distillate washes on dormant apple and plum trees was a more luxuriant growth the next season.

Jones (Welsh Journal Agric., 3, 1927, p. 293) noticed more vigorous growth also. Herbert (Journal Econ. Entom., 17, 1924, p. 567) noted stimulation to deciduous fruit trees from spraying especially when miscible oils containing heavy mineral oils were applied in winter, the bloom and setting of fruit being earlier, large green leaves forming early and larger crops.

It will thus appear that there will be no reason for any damage done to citrus from oil spraying if necessary precautions are considered.

Damage to citrus trees by the use of Hydrocyanic acid gas in fumigation is a very complicated problem. It is due to a collection of factors which cannot be separated, nor controlled.

One of the factors is the absorption of the gas through the leaf-stomata, and its solubility in the cell-sap. This will cause physiological disturbance, and if the absorption is high it usually causes leaf and fruit drop. Temperature, humidity, soil conditions, fungi diseases, degree of insect attack, watering, etc., combined together are factors which interfere in fumigation injury.

During the colouring season (November and December) fruits are very sensitive to fumigation and are liable to drop. The fruit pitting especially early in the season (July and August) very often occur and always reduce the market value of the fruit.

In other words it is easy to avoid damage to citrus by spraying with the

right oil-emulsion in the right time, but it is rather difficult in the case of fumigation ; because factors in the first case can be eliminated to a minimum while in the second it is impossible.

In considering the second point it is proved everywhere all over the world that spraying with oil emulsions for the control of scale insects is just as good as fumigation. On the contrary it is recorded that oil emulsions are more effective against some scales than fumigation.

The problem of Red Spider spreading in Egypt has drawn the attention of the Entomological Section to oil sprays. The Red Spider can be well controlled with oil sprays.

Now comes the last question and this is the cost. There is no doubt that spraying is less costly than fumigation in Egypt.

There is always a loss on fumigation of Citrus in Egypt. The Government loses about 50 % of the cost of fumigation yearly while in spraying there is a gain of about 25 %.

The Egyptian Oil " NAN "

This is manufactured by the Insecticide Sub-Section of the Entomological Section, and it is of the mayonnaise type. The oil content in the emulsion is 75 % and it is about 10 % less than any of the proprietory oil emulsions on the market. It is made of the permanent type with a good spreading quality. The white oil used is of the medium quality with an unsulphonated residue not less than 95 %. Another type called "Nan Summer" is made from light medium oil with a viscosity 60 sec. (Saybolt) is recommended for summer spraying when the temperature at that time of the year is high.

A new "Nan" of the Emulsive type is made and put under thorough testing before trying on a large scale.

Experiments

Oil emulsions of the mayonnaise type were tried in Egypt against scale insects and the results were tabulated and compared with those of the Egyptian oil "Nan". They were all tried on the same bases and same conditions. The proprietory oil emulsions were introduced into this country from U.S.A., Palestine, and Great-Britain, by Commercial Agents.

Tables I-XIII show the effect of oil emulsions on egyptian Black Scale (*Chrysomphalus ficus* Ril.), and it is marked on the Tables where new generations of the insect start.

It will be seen that the kill is kept high until a period when a new generation starts, it gradually comes down. This is more pronounced in localities where the experimental plot is surrounded with infested trees which are left untreated.

The percentage kill three months after treatment is always high. The result of the egyptien oil "Nan" is just as good as any of the proprietory oil emulsions, and in most cases stands at the top of the list. There was no case of scorching or fruit drop as a result of spraying with "Nan".

Tables XIV-XVI show the effect of oil emulsions against the new scale insect "*Chrysomphalus personatus* Comst.". The results are also quite good although this insect is supposed to be resistant to other control measures.

Tables XVII-XX show the effect of oil emulsions against the mealy-bugs. Tar oil emulsions gave better results than mineral oil emulsions.

Results of spraying with "Nan" are not lower than the other proprietory mineral oil emulsions.

Tables XXI-XXIII are for other scale insects, which show still good results.

Summary and Conclusions

1. Use of permanent oil emulsions in Egypt is much safer than semi-permanent or unstable oil emulsions. With the tank-mixture method the margin of safety to the citrus plants is very narrow and will be always risky to use this method.

2. The egyptian permanent oil emulsion which contains 75 % oil gave high kill to scale insects at 2 % with a big margin of safety to the plant.

3. It is almost necessary in Egypt to double treat heavily infested trees in one season. Partial treatment of infested groves will always lead to heavy infestion.

Acknowledgment

We wish to express our thanks to Prof. Dr. H. Priesner for encouraging and helping and to the staff of the sub-sections who helped us in carrying out our experiments.

TABLES I-XXIII

TABLE I

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on *Ficus nitida* trees at Kobba Garden's Forest.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 15.8.1936	Percentage kill on 15.9.1936	Percentage kill on 15.10.1936	Percentage kill on 15.11.1936	Percentage kill on 15.12.1936	Corrected percentage kill after 3 months
				*	*				
Volk (Summer) ..	5	15.7.36	2.5	100.0	100.0	99.3	44.0	29.0	99.2
Volk (May)	5	15.7.36	1.5	100.0	99.5	99.3	96.0	38.0	99.2
Citrolite	5	15.7.36	2.5	99.4	100.0	99.3	96.0	67.6	99.2
Hadrol	5	15.7.36	2.5	99.3	100.0	99.4	96.7	78.7	99.3
Tapazol	5	15.7.36	2.5	99.3	100.0	99.3	90.0	29.0	99.2
Blankocerum ..	5	15.7.36	2.5	75.0	98.0	93.7	63.0	25.6	93.2
Toxona	5	15.7.36	2.5	88.0	99.0	98.9	96.0	50.0	98.8
Nicona	5	15.7.36	2.5	97.9	98.0	98.9	88.0	33.5	98.8
Nan A 105	5	15.7.36	2.5	98.0	95.5	88.5	96.3	57.0	87.6
Nan A 115	5	15.7.36	2.5	95.0	96.0	97.6	99.0	63.0	97.6
Nan B 115	5	15.7.36	2.5	97.0	98.0	98.9	82.0	23.0	98.8
Nan A 111	5	15.7.36	2.5	95.0	92.0	90.0	20.0	—	89.2
Nan B 111	5	15.7.36	2.5	97.0	99.0	98.7	93.0	13.0	98.6
Nan A 110	5	15.7.36	2.5	100.0	100.0	99.0	93.0	29.0	98.9
Nan B 110	5	15.7.36	2.5	100.0	97.0	98.8	84.0	55.0	98.7
Nan C 110	5	15.7.36	2.5	100.0	99.0	99.0	99.5	27.0	98.9
Nan B 105	5	15.7.36	2.5	88.9	94.0	93.5	10.8	19.0	93.0
Nan A 101	5	15.7.36	2.5	97.8	92.0	93.0	82.0	23.0	92.5
Nan B 101	5	15.7.36	2.5	98.0	96.0	98.6	91.0	38.8	98.5
Nan A (Thio) ..	5	15.7.36	2.5	90.8	82.0	95.0	95.0	20.0	94.6
Control	10	—	—	2	5	7	7	6	—

* Will indicate when a new generation starts.

Nota: The degree of infestation was very high, and trees sprayed were amongst other heavily infested *Ficus* trees which were not treated.

TABLE II

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Barrage Experimental Station (Galiubia Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 5.11.1936	Percentage kill on 5.12.1936	Percentage kill on 5.1.1937	Percentage kill on 5.2.1937	Percentage kill on 5.3.1937	Percentage kill on 5.4.1937	Percentage kill on 5.5.1937	Corrected percentage kill after 3 months
Tapazol	7	3-5.10.36	2.0	98.5	99.5	92.0	89.0	* 91.0	50.0	21.0	90.0
Hadarol	12	3-5.10.36	2.0	96.5	97.5	96.0	92.0	96.0	64.0	10.0	95.0
Volk (Winter) ..	11	3-5.10.36	2.0	93.7	97.0	95.0	92.0	92.0	60.0	33.0	93.8
Volk (May)	12	3-5.10.36	1.5	100.0	100.0	99.0	97.0	98.0	85.0	47.0	98.8
Nan 1,10 C	12	3-5.10.36	2.0	100.0	100.0	99.0	94.5	93.0	70.0	67.0	98.8
Control	12	—	—	8	12	20	20	12	4	3	—

* Will indicate when a new generation starts.

Nota: The trees were heavily infested and plot surrounded with other heavily infested *Ficus* trees which were not treated.

TABLE III

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Mashtoul (Sharkia Province).

EMULSION	Nnmber of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 10.11.1936	Percentage kill on 10.12.1936	Percentage kill on 10.1.1937	Percentage kill on 10.2.1937	Percentage kill on 10 3.1937	Percentage kill on 10 4.1937	Percentage kill on 10.5.1937	Corrected percentage kill after 3 months
Volk (May)	20	10.10.36	1.5	99.0	96.6	96.0	96.0	96.0	72.0	70.0	95.1
Volk (Winter) ..	20	10.10.36	2.0	100.0	98.0	98.0	96.0	95.0	—	—	97.5
Tapazol	20	10.10.36	2.0	100.0	98.0	96.0	97.0	80.0	35.0	—	95.1
Nan 110 C	20	10.10.36	2.0	98.0	96.0	98.0	90.0	94.0	80.0	78.0	97.5
Control	7	—	—	5	11	19	20	12	4	3	—

Nota: The degree of infestation was high.

TABLE IV

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Mango trees near the Barrage (Galiubia Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 29.12.1936	Percentage kill on 29.1.1937	Percentage kill on 29.2.1937	Percentage kill on 29.3.1937	Percentage kill on 29.4.1937	Percentage kill on 29.5.1937	Corrected percentage kill after 3 months
Citro (medium)	10	29.11.36	2.5	97.5	92.0	* 95.5	94.0	93.0	94.0	94.4
Nan 110 C	25	29.11.36	2.5	96.5	99 0	96.0	97.0	94.0	95.0	95 0
Volk (Winter)	10	29.11.36	2.5	96.0	98.0	94.0	84.0	87.0	87.0	92.5
Control	10	—	—	15	20	20	15	7	5	—

* Will indicate when a new generation starts.

TABLE V

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus and Mango trees at Zeifeita, near the Barrage (Galiubia Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 3.2.1937	Percentage kill on 3.3.1937	Percentage kill on 3.4.1937	Percentage kill on 3.5,1937	Percentage kill on 3.6.1937	Percentage kill on 3.7.1937	Corrected percentage kill after 3 months
Volk (Summer)	50	3-5.1.37	2.0	92.0	96.0	93.0	87.0	90.0	91.0	92.7
Nan	50	3-5.1.37	2.0	93.0	86.0	96.0	89.0	.9.0	89.0	95.8
Nan	50	3-5.1.37	2.5	99.4	98.0	98.0	96.0	94.0	94.0	97.9
Citro (heavy)	50	3-5.1.37	2.0	93.7	96.0	96.0	94.0	92.0	91.0	95.8
Fumigated (1)	50	3-5.1.37	normal dose	99.0	100.0	99.0	99.0	99.0	99.0	98.9
Control	50	—	—	17	12	4	3	19	2	—

(1) Fumigated with pot method.

Nota: The degree of infestation varied in each plot. Trees sprayed with Volk and Nan were heavily infested and the degree was medium in trees sprayed with Citro emulsion, and low in fumigated trees.

Table VI

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Shoubra El Namla, near Tanta (Gharbia Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 2.4.1937	Percentage kill on 2.5.1937	Percentage kill on 2.6.1937	Percentage kill on 2.7.1937	Percentage kill on 2.8.1937	Corrected percentage kill after 3 months
Volk (Summer)	25	2.3.37	2.0	90.0	94.0	* 96.0	93.0	* 60.0	95.0
Citro (medium)	26	2.3.37	2.0	99.0	95.0	96.0	92.0	44.0	95.0
Volk (May)	40	2.3.37	1.5	90.0	84.0	85.0	90.0	31.0	81.5
Hadarol	28	2.3.37	2.0	99.0	99.0	97.0	91.0	87.0	96.3
Tapazol	10	2.3.37	2.0	99.0	99.0	97.0	92.0	41.0	96.3
Nan 110 C	31	2.3.37	2.0	99.0	97.0	98.0	93.0	60.0	97.5
Control	30	—	—	4	5	19	8	3	—

* Will indicate when a new generation starts.

Nota: At the north side of this grove lies one acre of Citrus 50-80 metres apart, heavily infested with Black Scale and which was left untreated.

TABLE VII

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Shoubra El Namla, near Tanta (Gharbia Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 30.11.1937	Percentage kill on 30.12.1937	Percentage kill on 30.1.1938	Percentage kill on 30.2.1938	Percentage kill on 30.3.1938	Corrected percentage kill after 3 months
Volk (May)	150	20-28.10.37	1.5	90.0	77.0	—	—	—	75.0
Tapazol	150	20-28.10.37	2.5	95.0	85.0	—	—	—	83.7
Volk (Summer)	150	20-28.10.37	2.5	92.0	98.0	—	—	—	97.8
Hadarol	150	20-28.10.37	2.5	85.0	75.0	—	—	—	72.8
Nan 110 C	150	20-28.10.37	2.5	91.0	96.7	—	—	—	96.4
Control	40	—	—	6	8	—	—	—	—

Nota: This Table gives the results of a second spraying of the grove mentioned on Table VI, but unfortunately rain fell heavily 3 days after spraying.

Table VIII

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Menufia Province.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 12.1.1938	Percentage kill on 12.2.1938	Percentage kill on 12.3.1938	Corrected percentage kill after 3 months	REMARKS
Volk (May)	56	11-12.12.37	1.5	99.0	99.0	* 98.0	98.0	
Tapazol	56	11-12.12.37	2.5	99.0	97.0	97.0	96.9	
Nan 110 C	56	11-12.12.37	2.0	99.0	98.0	97.0	96.9	
Nan 110 C	168	11-12.12.37	2.5	99.0	99.0	99.0	99.0	
Citro (medium) ..	56	11-12.12.37	2.5		Heavy leaf drop			Heavy leaf drop and fruit shedding after one week.
Citro (light)	56	11-12.12.37	2.0	95.0	93.0	93.0	92.7	
Volk (Summer)	56	11-12.12.37	2.5	99.0	98.0	97.0	96.9	
Citrol	28	11-12.12.37	2.5	98.0	98.0	97.0	96.9	
Hadarol	56	11-12.12.37	2.5	99.0	99.0	98.0	98.0	
Control	—	—	—	5	5	4	—	

* Will indicate when a new generation starts.

Nota: The degree of infestation in trees was medium (about 50 %).

TABLE IX

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Maadi (near Cairo).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 4.11.1937	Percentage kill on 4.12.1937	Percentage kill on 4.1.1938	Corrected percentage kill after 3 months	REMARKS
Nan 110 C	75	4.10.37	2.5	99.0	93.0	—	92.9	The trees were sprayed again on 27.2.1938 due to previous heavy infestation.
Volk (May)	55	4.10.37	1.5	95.0	57.0	—	56.1	
Hadarol	20	4.10.37	2.5	97.0	94.0	—	93.9	
Tapazol	55	4.10.37	2.5	98.0	94.0	—	93.9	
Control	—	—	—	5	2	—	—	

Nota: The degree of infestation was high.

TABLE X

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) at Rikka (Giza Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 26.12.1936	Percentage kill on 2.3.1937	Percentage kill on 29.5 1937	Corrected percentage kill after 3 months	REMARKS
Volk (Winter)	3000	4.12.26	2.0	99.0	* 92.2	80.0	77.7	Trees sprayed with Volk (Winter) shed about 10-15 % of their leaves and fruits, heavily infested trees shedded more.
Nan 110 C	400	4.12.36	2.0	100.0	99.0	99.0	98.9	No leaf nor fruit drop.
Control	40	—	—	11	15	10	—	

* Will indicate when a new generation starts.

Nota: The shedding of leaves and fruits in trees sprayed with Volk (Winter) was due to the low grade of oil used in preparing the emulsion. — The cold weather during January is partly responsible for the shedding.

TABLE XI

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) at Rikka (Giza Province).

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 6.1.1938	Percentage kill on 26.3.1938	Percentage kill on 4.1.1938	Corrected percentage kill after 2 months	REMARKS
Volk (May)	20	12.11.37	1.5	* 99.8	98.0	—	97.8	
Volk (Summer) ..	23	12.11.37	2.5	99.5	99.0	—	98.9	
Nan 110 C	312	12.11.37	2.5	99.5	99.5	—	99.4	
Control	20	—	—	—	8	—	—	

* Will indicate when a new generation starts.

Nota: This Table gives the results of a second spraying of the heavily infested grove mentioned on Table X.

TABLE XII

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Menufia Province.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 29.9.1936	Percentage kill on 2.11.1936	Percentage kill on 23.12.1936	Percentage kill on 6.2.1937	Percentage kill on 29.3.1937	Corrected percentage kill after 3 months
Citro (light)	6	14.9.36	2.0	100.0	98.9	99.3	98.4*	91.0	99.2
Citro (light)	6	14.9.36	2.5	100.0	99.9	97.9	99.9	99.0	97.7
Nan 110 C	24	14.9.36	2.0	100.0	100.0	98.0	99.9	100.0	97.7
Nan 110 C	60	14.9.36	2.5	100.0	99.9	100.0	97.0	99.5	100.0
Control	15	—	—	8	5	7	5	4	—

* Will indicate when a new generation starts.

Nota: The degree of infestation was high.

TABLE XIII

Results of spraying with mineral oil emulsions against Black Scale (*Chrysomphalus ficus* Ril.) on Citrus trees at Menufia Province.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 1.11.1937	Percentage kill on 23.11.1937	Percentage kill on 30.12.1937	Percentage kill on 20.3.1938		Corrected percentage kill after 3 months
Volk (May)	30	13.10.37	1.5	99.9	99.0	99.4	99.0		99.3
Volk (Summer)	30	13.10.37	2.5	98.0	99.0	99.4	97.5		99 3
Hadarol	15	13.10.37	2.5	90.0	98.0	99.0	98.0		98.8
Tapazol	15	13.10.37	2.5	99.9	95.0	99.1	85.5		92.0
Nicona	15	13.10.37	2.5	63.0	98.0	93.2	98.0		99.9
Nan 110 C	55	13.10.37	2.5	99.0	99.0	99.9	98.5		—
Citro (light)	5	13.10.37	2.5	99.0	98.5	98.0	98.0		97.6
Control	15	—	—	19	10	15	12		—

Nota: This Table gives the results of spraying of another section of the grove mentioned on Table XII. — The degree of infestation was high.

TABLE XIV

Results of spraying *Ficus* trees with mineral oil emulsions against *Chrysomphalus personatus* (Comst.) at Alexandria.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 25.11.1936	Percentage kill on 25.12.1936	Percentage kill on 25.1.1937	Percentage kill on 25.2.1937	Percentage kill on 25.3.1937	Percentage kill on 25.4.1937	Percentage kill on 25.5.1937	Percentage kill on 25.6.1937	Corrected percentage kill after 8 months	REMARKS
Nan 110 C	1	25.10.36	3.5	96.0	97.0	98.0	* 99.0	* 98.0	96.0	93.0	* 95.0	94 9	Two generations appeared during the period of examination.
Volk (Winter) ..	1	25.10.36	3.5	98.0	97.0	98.0	99 0	95.0	98.0	91.0	92.0	91.9	Leaf drop 20%.
Volk (May)	1	25.10.36	2.0	99.0	99.0	99.0	96.0	97.0	85.0	94.0	90.0	89.8	
Tapazol	1	25.10.36	3.5	100.0	99.0	98 0	98.0	98.0	98.0	98.0	90.0	89.8	
Hadarol	1	25.10.36	3.5	100.0	99.0	98.0	99.0	95.0	98.0	98.0	96.0	95.9	
Citro (medium) .	1	25.10.36	3.5	100.0	99.0	98.0	96.0	98.0	99.0	97.0	60.0	59.0	
Nicona	1	25.10.36	3.5	98 0	99.0	96.0	99.0	96.0	99.0	98.0	90.0	89.8	
Control	4	—	—	1.2	1.2	1	5	10	4	2	2	—	

* Will indicate when a new generation starts.

Nota: The degree of infestation was high.

TABLE XV

Results of spraying *Ficus* trees with mineral oil emulsions against *Chrysomphalus personatus* (Comst.) at Alexandria.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on December 1936	Percentage kill on January 1937	Percentage kill on February 1937	Percentage kill on March 1937	Percentage kill on April 1937	Percentage kill on May 1937	percentage kill on June 1937	Corrected percentage kill after 7 months	REMARKS
Nan 110 C	1	Nov. 1936	3.5	95.0	96.0	97.0	97.0	54.0	88.0	82.0	81.6	Two generations appeared during the period of examination.
Volk (May)	1	Nov. 1936	2 0	99.0	97.0	99.0	99.0	96.0	95.0	90.0	89.8	
Volk (Winter) ..	1	Nov. 1936	3.5	97.0	100.0	99.0	97.0	99.0	92.0	44.0	43.0	Leaf drop 20%.
Tapazol	1	Nov. 1936	3.5	97.0	97.0	99.0	98.0	98.0	93.0	83.0	82.6	
Hadarol	1	Nov. 1936	3.5	96.0	95.0	92.0	80.4	99.0	90.0	80.0	79.6	
Citro (medium) .	1	Nov. 1936	3.5	96.0	96.0	94.0	67.0	70.0	90.0	70.0	69.4	
Toxona	1	Nov. 1936	3.5	91.0	83.0	95.0	88.0	86.0	85.0	73.0	72.4	
Control	4	—	—	1	5	10	4	2	2	2	—	

Nota: The degree of infestation was high.

TABLE XVI

Results of spraying heavily infested *Ficus* trees against *Chrysomphalus personatus* (Comst.) at Alexandria.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on February 1937	Percentage kill on March 1937	Percentage kill on April 1937	Percentage kill on May 1937	Percentage kill on June 1937	Percentage kill on July 1937	Corrected percentage kill after 6 months	REMARKS
Nan 110 C	2	Jan. 1937	3.5	80.0	* 90.0	71.0	* 83.0	* 94.0	* 95.0	94.9	Two generations appeared during the period of examination.
Volk (May)	2	Jan. 1937	2.0	93.0	94.0	96.0	94 0	86.0	76.0	75 5	Leaf drop 20%.
Volk (Winter) ..	2	Jan. 1937	3.5	99.0	99.0	97.0	90.0	94.0	90.0	89.8	
Tapazol	2	Jan. 1937	3.5	99.0	90.0	94.0	97.0	97.0	90.0	89.8	
Hadarol	2	Jan. 1937	3.5	99.0	99.0	96.0	95.0	69.0	80.0	79.6	
Toxona	2	Jan. 1937	3.5	95.0	97.0	96.0	95.0	89.0	82.0	81.6	
Control	4	—	—	8	2	9	10	4	2	—	

* Will indicate when a new generation starts.

Nota: Mineral oil emulsions used.

TABLE XVII

Results of spraying heavily infested Guava trees with oil emulsions (mineral and tar oils) against mealy-bugs (*Pseudococcus citri* Risso) near Cairo.

EMULSION	Kind of oil	Date of spraying	Number of trees sprayed	Percentage of emulsion	Date of appearance of living insects and number of infested trees		REMARKS
					25.7.1937	30 8.1937	
Nan 110 C	Mineral	21.1.37	32	3.0	all (50 %)	all (60 %)	Trees normal after spraying and no shedding.
Volk (Winter) ..	Mineral	21.1.37	32	3.0	all (40 %)	all (50 %)	Slightly affecting leaves with slight shedding.
Carbo-Crimp ...	Mineral + tar miscible oil	21.1.37.	50	5.0	—	all (3 %)	Leaves turned to pink with 50% shedding.
Ialine	Mineral + tar miscible oil	21.1.37	30	5.0	—	all (5 %)	Leaves turned to pink with 30% shedding.
Control	Trees were heavily infested and retained this condition during the period of examination.						

Nota: The degree of infestation was high (70%), and sprayed trees were examined monthly.

TABLE XVIII

Results of spraying heavily infested Guava trees with oil emulsions (mineral and tar oils) against mealy-bugs (*Pseudococcus citri* Risso) at Galiubia Province.

EMULSION	Kind of oil	Date of spraying	Number of trees sprayed	Percentage of emulsion	Date of appearance of living insects and number of infested trees		REMARKS
					13.8.1937	10.11.1937	
Nan 110 C	Mineral	10.1.37	82	3.0	2	17	No effects on trees and condition was normal.
Nan 110 C	Mineral	10.1.37	61	4.0	1	13	No effects on trees and condition was normal.
Carbo-Crimp ...	Mineral + tar miscible oil	10.1.37	69	4.0	2	2	Leaves turned to pink with 40% shedding.
Carbo-Crimp ...	Mineral + tar miscible oil	10.1.37	69	5.0	2	2	Leaves turned to pink with 50% shedding.
Volk (Winter) ..	Mineral	10.1.37	70	3.0	1	4	No effects on trees and condition was normal.
Ialine	Mineral + tar miscible oil	10.1.37	47	4.0	2	2	Leaves turned to pink with 20% shedding.
Ialine	Mineral + tar miscible oil	10.1.37	46	5.0	2	2	Leaves turned to pink with 30% shedding.
Control	Trees were heavily infested and retained this condition during the period of examination.						

Nota: The degree of infestation was high, and sprayed trees were examined monthly.

TABLE XIX

Results of spraying heavily infested Guava trees with oil emulsions (mineral and tar oils) against mealy-bugs (*Pseudococcus citri* Risso) at Gaafra (Shebin).

EMULSION	Kind of oil	Date of spraying	Number of trees sprayed	Percentage of emulsion	Appearance of living insects on trees	REMARKS
Nan 110 C	Mineral	1.4.37	16	3.0	Slight infestation starting on 1.11.1937	Trees normal after spraying and no shedding.
Volk (Winter) ..	Mineral	1.4.37	18	3.0	Slight infestation starting on 1.11.1937	Slightly affecting leaves with little shedding.
Carbo-Crimp ...	Mineral + tar miscible oil	1.4.37	11	5.0	Slight infestation starting on 1.11.1937	Leaves turned to pink with 50% shedding.
Carbo-Crimp ...	Mineral + tar miscible oil	1.4.37	8	4.0	Slight infestation starting on 1.11.1937	Leaves turned to pink with 40% shedding
Ialine	Mineral + tar miscible oil	1.4.37	8	4.0	Trees nearly free	
Ialine	Mineral + tar miscible oil	1.4.37	8	5.0	Slight infestation starting on 1.11.1937	Leaves turned to pink with 40% shedding.
Control	Trees were heavily infested and retained this condition during the period of examination.					

Nota: The degree of infestation was medium (50%), and sprayed trees were examnied monthly.

TABLE XX

Results of spraying Citrus and Guava trees with oil emulsions against mealy-bugs (*Icerya aegyptiaca* Douglas) near Giza.

EMULSION	Kind of oil	Date of spraying	Number of trees sprayed	Percentage of emulsion	Degree of infestation	Date of appearance of living insects and percentage of infested trees		REMARKS
						2.8.1937	2.12.1937	
Nan 110 C	Mineral	9.2.37	20	2.5	Heavy	40	40	On Citrus trees
Nan 110 C	Mineral	9.2.37	10	3.0	Heavy	40	40	On Citrus trees
Nan 110 C	Mineral	9.2.37	21	3.0	Medium	10	5	On Guava trees
Volk (Summer) .	Mineral	9.2.37	20	2.5	Heavy	40	50	On Citrus trees
Volk (Summer) .	Mineral	9.2.37	20	3.0	Heavy	30	40	On Citrus trees
Carbo-Crimp ...	Mineral + tar miscible oil	9.2.37	21	4.0	Medium	Free from infestation		On Guava trees
Ialine	Mineral + tar miscible oil	9.2.37	21	4.0	Medium	Free from infestation		On Guava trees
Control	Trees were heavily infested and retained this condition during the period of examination.							

Nota: The degree of infestation was high, and sprayed trees were examined monthly.

TABLE XXI

Results of spraying with mineral oil emulsions against *Chrysomphalus ficus* Ril., *Lepidosaphes beckii* Newm. and *Parlatorea zizyphi* Lucas, carried out on Citrus trees at Alexandria.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 13.3.1938			Percentage kill on 22.5.1938			Percentage kill on 26.6.1938		
				Chrysomphalus	*Lepidosaphes*	*Parlatorea*	*Chrysomphalus*	*Lepidosaphes*	*Parlatorea*	*Chrysomphalus*	*Lepidosaphes*	*Parlatorea*
Nan 110 C	42	3-4.2.38	1.5	99.0	98.0	—	97.0	98.0	—	98.0	75.0	—
Nan 110 C	42	3-4.2.38	2.0	98.0	99.0	—	94.0	96.0	—	98.0	70.0	—
Nan 110 C	24	3-4.2.38	2.5	99.0	99.0	—	98.0	97.0	—	87.0	77.0	—
Volk (May)	56	3-4.2.38	1.5	99.0	99.0	95.0	94.0	98.0	—	99.0	99.0	99.0
Volk (May)	40	3-4.2.38	2.0	99.0	99.5	92.0	93.0	90.0	92.0	100.0	100.0	100.0
Control	48	—	—	3	50	5	85	64	68	55	13	20

Nota: Three days after spraying heavy rain fell.

TABLE XXII

Results of spraying with mineral oil emulsions against *Lecanium longulum* Douglas, carried out on Custard Apples at Salhia (Sharkia Province).

EMULSION	Kind of oil	Date of spraying	Number of trees treated	Percentage of emulsion	DATE OF APPEARANCE OF LIVING INSECTS ON TREES: 10.8.1937
Nan 110 C	Mineral	21.12.36	78	2.5	No infestation.
Hadarol	Mineral	21.12.36	78	2.5	No infestation.
Tapazol	Mineral	21.12.36	78	2.5	No infestation.
Volk (Winter) ..	Mineral	21.12-36	78	2.5	No infestation.
Volk (Winter) ..	Mineral	21.12.36	78	3.0	No infestation.
Volk (May)	Mineral	21.12.36	78	2.0	Infestation appearing in 30% of the treated trees.
Ialine	Mineral + tar miscible oil	21.12.36	78	3.0	No infestation.
Carbo-Crimp ...	Mineral + tar miscible oil	21.12.36	78	3.0	No infestation.
Control	The degree of infestation was high and trees were examined monthly.				
Nota: The degree of infestation was about 20%.					

TABLE XXIII

Results of spraying *Ficus nitida* trees with mineral oil emulsions against *Parlatorea zizyphi* Lucas, at Alexandria.

EMULSION	Number of trees treated	Date of spraying	Percentage of emulsion	Percentage kill on 16.8.1937	Percentage kill on 16.9.1937	Percentage kill on 16.10.1937	Percentage kill on 16.11.1937	Corrected percentage kill after 4 months
Nan 110 C	2	16.7.1937	2.5	99.9	99.9	98.0	100.0	100.0
Nan 110 C	2	16.7.1937	3.0	99.9	100.0	100.0	100.0	100.0
Volk (May)	2	16.7.1937	3.0	97.0	78.0	84.0	86.0	85.0
Volk (May)	2	16.7.1937	2.5	98.0	100.0	100.0	100.0	100.0
Control	4	—	—	5	5	2	3	—

Nota: The degree of infestation was high and trees were examined monthly.

Le Nid et la Ponte des Courtilières

(Orthoptera: Gryllidae-Gryllotalpinae)

(avec 2 Figures)

par Antoine Cassab

Une étude sur l'accouplement des courtilières a fait l'objet d'un article de l'auteur, publié dans ce Bulletin, année 1936, pages 24-25. La présente note traite des opérations qui suivent la pariade : la nidification et la ponte.

Nidification

L'insecte fécondé ne tarde pas à établir son nid. A cet effet, il choisit les terres à végétation peu dense ou nulle, situées en bordure des cultures ou à proximité des cours d'eau. Un sous-sol argileux d'une certaine consistance, riche en humus et normalement humide, complète les facteurs favorables requis pour la nidification, la ponte et le développement des stades post-embryonnaires.

Au réseau des galeries souterraines déjà existantes, la courtilière creuse une nouvelle galerie de direction semi-circulaire et terminée en cul de sac, dénommée « galerie de garde ». L'extrémité en est agrandie, par tassement des parois, jusqu'à former une cavité ellipsoïde, de $3\frac{1}{2}$ centimètres de hauteur au centre, à base aplatie mesurant 5 centimètres de diamètre [1]. Cette cavité, que les auteurs d'expression anglaise désignent du nom de « egg-chamber », constitue le nid.

Le creusement de la galerie conduisant au nid et l'achèvement de ce dernier nécessitent de 26 à 32 heures.

L'époque la plus favorable à la nidification est le mois de Mai. En effet, sur 65 nids observés, 11 datent du mois d'Avril, 35 de Mai, 15 de Juin et 4 de Juillet.

Une même femelle peut établir plusieurs nids durant la saison (Mars-Juillet), en moyenne 3, exceptionnellement 5. Ils sont généralement situés à une profondeur de 10-15 centimètres du niveau du sol, les plus rapprochés se trouvent à 6 centimètres, les plus distants à 31 centimètres. Un petit relief linéaire et plus ou moins sinueux de terre à la surface du sol indique la pré-

(1) Ces dimensions se rapportent aux nids de *Gryllotalpa gryllotalpa* Linné et à sa forme brachyptère (= *cophta* de Haan). Les nids de *Gryllotalpa africana* Pal. de Bauv. sont un peu moins grands.

Fig. 1. — Le nid, les œufs et la galerie de garde des courtilières (grandeur naturelle).

Fig. 2. — Oeuf de courtilière (× 8).

sence de galeries souterraines, une légère saillie du terrain localise parfois les nids (2).

(2) Ces indices permettront au cultivateur de reconnaître les terres infestées. Des labours en vue de la destruction des nids, pour être efficaces, devraient donc atteindre une profondeur d'au moins 20 centimètres.

Ponte

Le nid achevé, la ponte commence. Une femelle pouvant établir jusqu'à 5 nids, peut par conséquent avoir autant de pontes. Toutefois, la moyenne en est de 3, chaque ponte se distinguant des autres par le nombre d'œufs qu'elle contient, comme indiqué dans le Tableau ci-dessous :

Gryllotalpa vulgaris et forme brachyptère (*cophta*)				*Gryllotalpa africana*			
PONTE	NOMBRE D'ŒUFS			PONTE	NOMBRE D'ŒUFS		
	Minimum	Maximum	Moyenne		Minimum	Maximum	Moyenne
Première ...	220	300	250	Première ...	33	75	45
Deuxième...	140	200	160	Deuxième ...	25	55	29
Troisième...	100	160	120	Troisième ...	15	35	19

Les œufs fraîchement pondus de *Gryllotalpa vulgaris* Linné et de sa forme brachyptère (*cophta* de Haan), ont $2\frac{1}{2}$-3 millimètres de long et 1-$1\frac{1}{2}$ millimètre de large. Ils augmentent de volume à l'approche de l'éclosion, pour atteindre 3-4 millimètres de longueur et $1\frac{1}{2}$-2 millimètres de largeur. Ceux de *Gryllotalpa africana* Pal. de Bauv. sont un peu plus petits. Leur couleur jaune-verdâtre du début tourne au brunâtre au fur et mesure de l'avancement de leur état d'incubation.

Au terme de sa ponte, la courtilière se retire dans la « galerie de garde » qui contourne le nid et elle y séjournera en sentinelle vigilante pour veiller sur ses œufs et sa progéniture.

BULLETIN

DE LA

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DU

VINGT-DEUXIÈME VOLUME

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